

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
No. 1309

SATURDAY, JULY 29, 1944
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

PUBLIC LIBRARY

AUG 18 1944

✓
DETROIT

A BUG'S BIGGEST BEATING



THE Bugs which cause wound infections are taking their 'biggest beating' from the wonderful new drug—PENICILLIN—which is being used in ever-increasing quantities to promote rapid healing of War wounds.

Audley are proud to have supplied a considerable proportion of the Valves needed for the production of PENICILLIN.

And, of course, 'AUDCO' LUBRICATED VALVES will meet most of your needs as well.



AUDLEY ENGINEERING COMPANY LIMITED
• NEWPORT • SHROPSHIRE • ENG •

WELLS OIL FILTERS**gives OLD OIL****NEW LIFE**

With Wells' Waste-Oil Filter you can use your oil several times over and change it more often. A thoroughly reliable supply of oil is assured with the use of Wells' Special Filter Pads which work in conjunction with Wells' Patent Syphon Feed.



**A.C. WELLS
& CO. LTD**

PROVIDENCE MILLS · HYDE · CHESHIRE

Write for fuller particulars of these oil filters.
Telephone : Hyde 953
Telegrams : Un-breakable Hyde.

W

HYDROFLUORIC ACID

**AMMONIUM BIFLUORIDE
ACCUMULATOR ACID
SODIUM FLUORIDE
FLUORIDES**

*Also Specially Pure Hydrochloric, Nitric and Sulphuric
ACIDS FOR ANALYSIS*

**JAMES WILKINSON & SON, Ltd.
TINSLEY PARK ROAD, SHEFFIELD**

Telegrams: "Chemicals, Sheffield" Phone: 41208-9

BAKELAQUE PHENOLIC RESINS

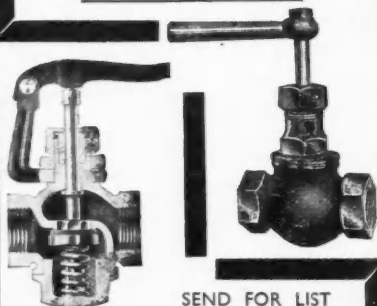
- for acid-proof coatings
- for abrasive wheels
- for electrical insulation

ATTWATER & SONS, Ltd.

Est. 1868

**HOPWOOD STREET MILL,
PRESTON, ENG.**

VALVES, OF ALL TYPES IN ALL METALS FOR CHEMICAL DUTIES



SEND FOR LIST

BRITISH STEAM SPECIALTIES Ltd
WHARF STREET, LEICESTER

ALSO AT
LONDON, LIVERPOOL, GLASGOW, BRISTOL,
MANCHESTER, NEWCASTLE-ON-TYNE

DRYING

★ FOR INDUSTRY AND AGRICULTURE

The RIGHT plant to suit YOUR drying problems, can be supplied

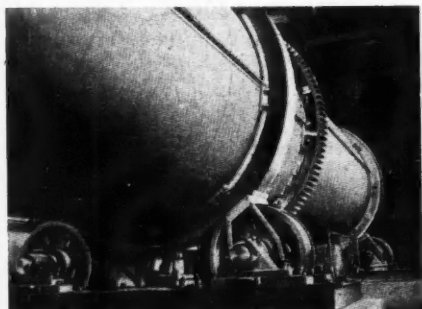
by

BAMAG

BAMAG LIMITED
UNIVERSAL HOUSE

60, BUCKINGHAM PALACE ROAD,
LONDON, S.W.1.

Telephone: SLOane 9282.



8a

STREAMLINE HYDROMETERS

of guaranteed accuracy for
IMMEDIATE DELIVERY!

Towers streamline Hydrometers are made from Normal glass tubing and are of guaranteed accuracy.

A wide range is made including specific gravity, Twaddell, Brix, I.P., Density, S.T.P.T.C Lactometers, etc., etc.

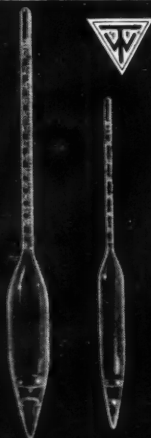
A copy of our new catalogue will be sent on application.

Made at our Hydrometer Works, Hough Green, Nr. Widnes.

J. W. TOWERS & CO. LTD.

Head Office and Works: WIDNES

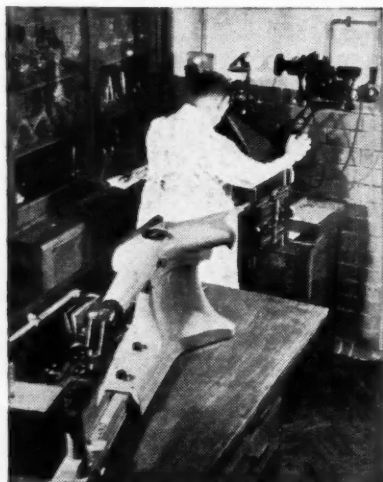
MANCHESTER: 44 Chapel St., Salford 3 · LIVERPOOL: 134 Brownlow Hill



TOWERS

SCIENTIFIC LABORATORY APPARATUS

GENATOSAN LABORATORIES SPECIALISE IN



RESEARCH ON

PURINES & PYRIMIDINES

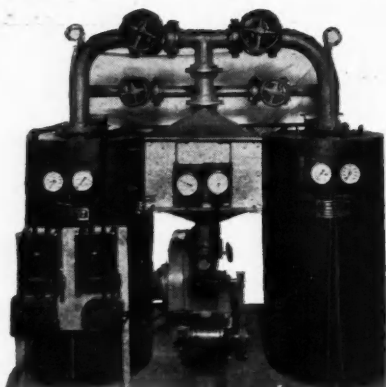
The following are available on a plant production basis :

Uric acid, Alloxan, Alloxantin, Allantoin, Acid Sodium urate.

Limited small quantities of the following are available for research purposes :

Violuric acid, Uracil, Thiouracil, Dialuric acid, Triaminopyrimidine, Murexide.

Enquiries to **GENATOSAN LTD., LOUGHBOROUGH, LEICS.**



KESTNER DOUBLE ABSORBER SILICA GEL DRIER WITH ELECTRIC REGENERATOR.

WRITE FOR LEAFLET 245.

KESTNER

SILICA GEL

For Air and Gas

DRIERS

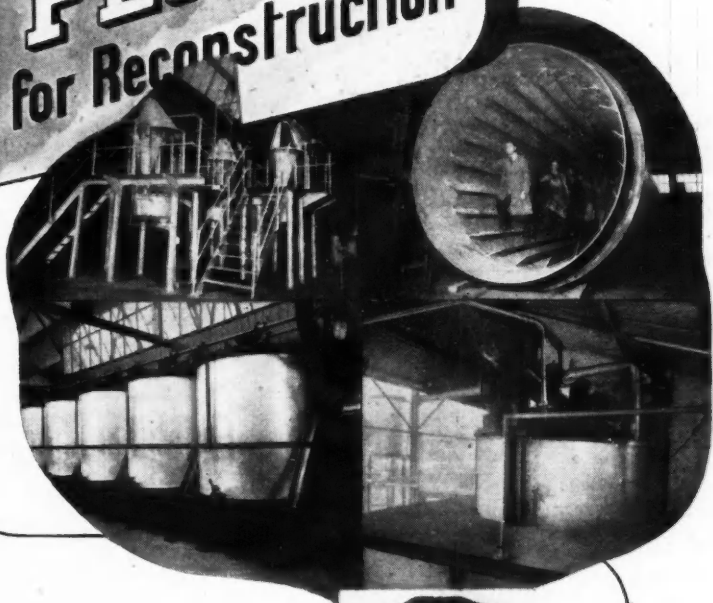
are being increasingly applied in the numerous problems presented by the moisture control of air, gases, and solids. There are many and varied conditions in which low, or definite moisture content is necessary. Kestner Silica Gel drying plants have practically unlimited life, as the Silica Gel is easily re-activated. We should be pleased to provide further information and to put our wide experience in this matter at your service for any problem which you may have.

KESTNER EVAPORATOR & ENGINEERING CO. Ltd.

Chemical Engineers - 5, GROSVENOR GARDENS, LONDON, S.W.1

PLANT

for Reconstruction



"WILL YOU FIGURE IN RECONSTRUCTION DEVELOPMENT?"

the programmes now taking shape will make new and increased demands on YOUR Industry . . . look to your plans . . . and your PLANT now! We shall be glad to submit designs or work to your specifications for Agitating Vessels, Stills, Drums, Mixing Pots, Storage Tanks, etc., in Stainless or Mild Steel, Copper, Brass, Aluminium or specific alloys.



SEND FOR THE BOOK illustrating plant we have produced for YOUR industry . . . Post Free on application if you mention this Journal please.

The LONDON ALUMINIUM Co., Ltd. WITTON, BIRMINGHAM, 6.

GLYCERINE

THE improved supply position makes it possible for the present to consider applications from recognised users for its release for all purposes, including the manufacture of cakes, confectionery, and export goods; also for bottling for resale to the public.

Contracts on the usual buying terms can be made with producers subject to the release of deliveries by the U.K. Glycerine Producers Association. Application forms are obtainable from the Association or from Glycerine Producers.

U.K.G.P.A. Ltd.

4 WATERGATE, LONDON, E.C.4

LG 1A-683

A. J. RILEY & SON, LTD. BATLEY, YORKS

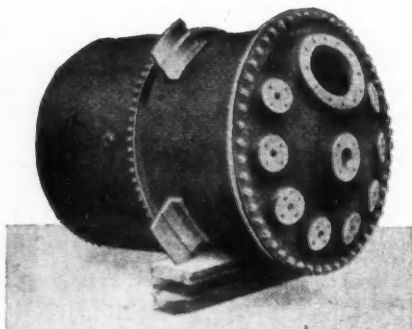
Telegrams: "BOILERS, BATLEY."

Telephone: 657 BATLEY (3 lines)

ESTABLISHED 1888

Makers of

MILD STEEL RIVETED AND
WELDED VESSELS
JACKETED PANS COMPLETE
WITH AGITATORS
SHEET LEAD OR HOMOGENEOUS
LINED VESSELS
TAR, BENZOLE & OIL STILL
CONDENSERS, EVAPORATORS
AND DISTILLING PLANTS
MILD STEEL PIPES
ALL PRESSURES
LANCASHIRE, CORNISH
ECONOMIC & W.T. BOILERS



VITREOSIL FILTERING & IGNITION CRUCIBLES



WE can now supply **VITREOSIL** crucibles for filtration and subsequent ignition at temperatures up to $1,000^{\circ}\text{C}$. Filtration without asbestos mats, ignition and weighing are all done in the same crucible. Laboratory workers will appreciate the value of these great advantages of the **VITREOSIL** filtering crucible.

THE THERMAL SYNDICATE LTD.

Head Office :

WALLSEND,
NORTHUMBERLAND.

London Depot :

12-14, OLD PYE STREET,
WESTMINSTER, S.W.1.



DORR-OLIVER EQUIPMENT AND PROCESSES ON ACTIVE SERVICE

IN THE CHEMICAL INDUSTRY

FOR TREATMENT OF LIQUID SOLID SUSPENSIONS

Take advantage of our knowledge gained through years of experience, and submit your difficulties to us.

DORR-OLIVER CO. LTD.




**ABFORD HOUSE, WILTON ROAD
LONDON, S.W.1**

**PRECISION
TURNED &
SCREWED
REPETITION
WORK IN ALL
METALS**

•
**ON AIR MINISTRY
ADMIRALTY &
WAR OFFICE
LISTS**

•
**'PHONE:
NOTTINGHAM
46068 (3 Lines)**

**'GRAMS:
CAPSTAN,
NOTTINGHAM**



**CASTLE ENGINEERING CO.,
(NOTTINGHAM) LTD.**

HASLAM ST., CASTLE BOULEVARD, NOTTINGHAM

NOW AVAILABLE in experimental quantities

CALCIUM-MAGNESIUM

CALCIUM-COPPER

CALCIUM-LEAD

CALCIUM-ZINC

BARIUM-MAGNESIUM

BARIUM-LEAD

STRONTIUM-MAGNESIUM

Enquiries for other Alloys are invited.

Ca, Sr and Ba ALLOYS



For samples and information apply to:
IMPERIAL CHEMICAL INDUSTRIES LIMITED
LONDON, S.W.1.

CN. 1124M

INDUSTRIAL DERMATITIS

accounts for the majority of the cases of industrial disease occurring in the factories annually and these can be prevented (*Min. Lab. & Nat. Serv.*)

TO AVOID WASTAGE OF LABOUR IS A NATIONAL DUTY

ROZALEX

is the barrier substance for the prevention of dermatitis and has given satisfaction to thousands of firms for many years.

There is a grade for every trade



ROZALEX LIMITED 10 NORFOLK STREET MANCHESTER 2

BARBITONE

AND

BARBITONE SOLUBLE

FINEST QUALITY.

ACTUALLY MANUFACTURED AT BARNET

PIERSON, MORRELL & CO., LTD.

(THE ORIGINAL BRITISH ASPIRIN MAKERS)

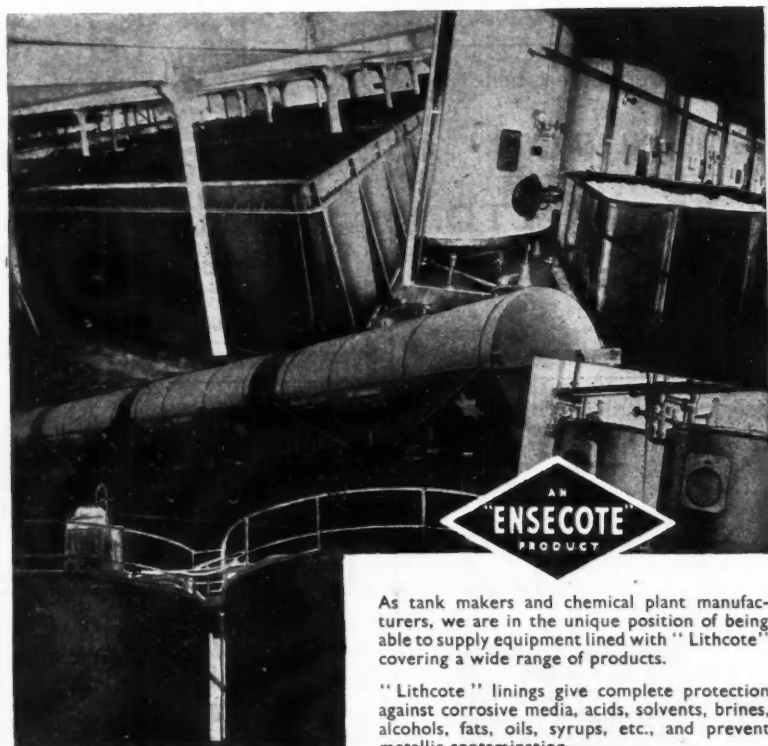
QUEEN'S ROAD - BARNET - HERTS

Phone : Barnet 0723

Grams : Pierson, Morrell, Barnet

"LITHCOTE"

*Proved in Practice
Improved by Research.*



As tank makers and chemical plant manufacturers, we are in the unique position of being able to supply equipment lined with "Lithcote" covering a wide range of products.

"Lithcote" linings give complete protection against corrosive media, acids, solvents, brines, alcohols, fats, oils, syrups, etc., and prevent metallic contamination.

All enquiries in the United Kingdom and Ireland to

NEWTON CHAMBERS

& CO LTD

THORNCLIFFE

NR SHEFFIELD

LONDON OFFICE: ARTILLERY HOUSE, ARTILLERY ROW, S.W.1.

LEAD BURNING

AND
HOMOGENEOUS
LEAD LINING

COILS
LUTES

VATS
CHAMBERS

and every description
of
CHEMICAL LEAD WORK

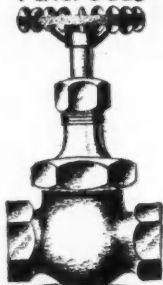
H. PRATT LTD.

POTTERS LANE · ASTON
BIRMINGHAM · 6

Telephone:
ASTON CROSS 2141-2

Telegrams:
"SANIVENTI"

STEAM & WATER FITTINGS FOR ALL
PURPOSES



**TRIONITE
VALVES**

ENSURE THE MAXIMUM OF EFFICIENCY
TOGETHER WITH LONG LIFE UNDER
ALL WORKING CONDITIONS

Also SAND CASTINGS IN ALL NON-FERROUS METALS
INCLUDING HIGH TENSILE BRONZES & ALUMINIUM

Trionite Ltd., Cliffe Vale, Stoke-on-Trent

PHONE : STOKE-ON-TRENT 2171-2

*The
BEAR
fact
is —*

**BURGESS
ZEOLITE**

*gives longer runs
between regeneration*

BURGESS ZEOLITE COMPANY LIMITED
68-72, HORSEFERRY ROAD, WESTMINSTER, S.W.1. Tel: ABBey 1868

use..

**ACTIVATED
ALUMINA**

(BRITISH MANUFACTURE)

of high adsorptive
efficiency, for dehydration
of gases and liquids, oil
refining and air
conditioning, and as an
effective catalytic agent
for many chemical
reactions...

ALL ENQUIRIES TO:-

PETER SPENCE & SONS LTD

NATIONAL BUILDINGS · MANCHESTER 3

BRIDGE STREET, MANCHESTER 3 · HANOVER GREEN · DALING



There's money in the air

Wherever solvents are used money whether an active carbon recovery plant literally takes to the air as the result would be a worth-while proposition, our advisory department can clear the air by of evaporation and in many industrial plants this wastage can be very serious. supplying you with the necessary details.

There isn't the space here to list all the industries which can benefit from solvent recovery but, if you use solvents at all, and are in any doubt

**SUTCLIFFE, SPEAKMAN
AND COMPANY LTD · LEIGH, LANCASHIRE**

London Office: 66 Victoria Street, S.W.1
Tel.: VIC. 7982-3.

FINE and SUPERFINE GRINDING FOR THE TRADE

To pass 15,000 holes to linear inch!

Is this possible? Yes, by our specialised equipment with some selected materials we have been able to reduce to this fine state of division.

But we are regularly grinding materials from 150 mesh to 3,000 mesh and better.

Send us your problems.

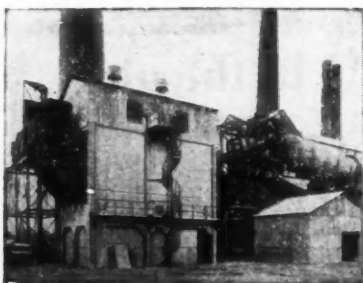
T. S. WILSON & CO.,
16, PHILPOT LANE, LONDON, E.C.3.

Mansion House. 8138/9

**CLEAN
GAS**

LODGE COTTRELL

ELECTROFILTERS



Head Office and
Works:
BIRMINGHAM.

War-time Office
for LONDON:
16, Church Street,
Godalming,
Surrey.

FOR
COMPLETE
PRECIPITATION OF

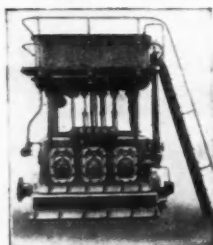
CEMENT KILN DUST
TAR FOG & ACID MIST
BOILER FLUE DUST
PYRITES DUST
SMELTER FUMES
BLAST FURNACE DUST

LODGE-COTTRELL LIMITED

PIONEERS AND SPECIALISTS

HIGH AND LOW PRESSURE

AIR & GAS COMPRESSORS



5-STAGE COMPRESSOR
4.0 Atm.

For pressures up to 1,000 Atm. and capacity up
to units absorbing 3,500 B.H.P.

Also

WATER COOLING PLANT, STEAM ENGINES
AND TURBINES, OIL ENGINES, &c.

PETER BROTHERHOOD LTD.

PETERBOROUGH

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON

GLASGOW: 116 Hope Street (Central 3970)

Telephone: CENTRAL 3212 (10 lines)

BIRMINGHAM: Daimler House, Paradise Street (Midland 0784 3)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

VOL. LI
No. 1309.

July 29, 1944

Annual Subscription 21s.
Overseas 26s.

Practical Training for Industry

THE necessity for efficiency in industry to which we made reference last week involves the use of the best plants and processes available and, equally, an adequate number of properly trained men to operate them. We are coming to the point where almost every worker in industry will have to be trained to do his job. That, of course, has always been true to some extent, but the standard of this training will have to be a great deal higher than it has been in the past. The training of the higher members of the staff, the chemical engineers, the qualified chemists, and the management, can be left to the universities to some extent. The universities will be over-taxed to provide enough such men and they cannot be expected to undertake the training of the lower grades of staff or of the workmen, at any rate for the time being. The Federation of British Industries in its report *Industry and Education*, says: "Industry has a great responsibility as regards the education and training of the young, both inside and outside the works, a responsibility which it has not always accepted in the past. It is, however, something which, for the future, must be shouldered if the benefits which the country expects to receive from

the forthcoming educational reconstruction are to be realised. In this connection the Federation notes with approval the increasing tendency for firms to appoint education officers, who should be consulted by managements on all general educational matters and should be charged with the development and supervision of suitable education and training schemes."

There is a place for what may be termed the semi-trained man even in the most highly expert departments and this may give us a cue as to how industry can best train its own staff. For example, Dr. J. G. King, the Director of the Gas Research Board, has indicated (in a paper before the Institution of Gas Engineers) that in his view, in addition to fully qualified research chemists, the research team must comprise an assistant staff, whose relative numbers will vary with the kind of work undertaken, but who would comprise three classes: (1) Boys or girls working their way towards an academic degree; (2) Laboratory assistants skilled in the art but unlikely to achieve high academic qualifications; (3) Skilled labourers capable of controlling continuous experiments on shift work. The first group forms a source

On Other Pages

| | |
|---|-----|
| <i>Notes and Comments</i> | 97 |
| <i>Chemicals by Rail</i> | 99 |
| <i>Scientific Research in Eire</i> | 104 |
| <i>Practical Emulsions</i> | 105 |
| <i>Bending Copper Tubing</i> | 107 |
| <i>Total Synthesis of Quinine</i> | 108 |
| <i>New British Standards</i> | 108 |
| <i>Oil and Colour Chemists' Association</i> | 108 |
| <i>Barytes in Scotland</i> | 111 |
| <i>Parliamentary Topics</i> | 112 |
| <i>Industrial Design</i> | 113 |
| <i>Personal Notes</i> | 114 |
| <i>The Priestley Gavel</i> | 114 |
| <i>Transylvanian Minerals</i> | 114 |
| <i>General News from Week to Week</i> | 115 |
| <i>Leechams Pills, Ltd.</i> | 117 |
| <i>Commercial Intelligence</i> | 117 |
| <i>Company News</i> | 117 |
| <i>Stocks and Shares</i> | 117 |
| <i>British Chemical Prices</i> | 118 |

for recruitment to research or industrial appointments. Members of the second are more likely to remain in the research atmosphere and have a special value in thereby forming a solid background of experience that helps considerably in smoothing the path of new recruits to the research staff. The third class constitutes the cheapest (and probably also the most effective) method of controlling semi-scale experimental work, since they can concentrate within such limited horizons as maintaining constant temperature or pressure conditions or rates of flow, with a success usually denied to research assistants with wider interests.

Not everyone can go to a university. The number of places available must always be limited. It will only be possible to send there the most brilliant of the scholars from the secondary schools and if the majority of students are expected, as they have been in the past, to contribute material sums for educational fees, there will be fewer people than ever after this war who will be able to afford it. It is exceedingly important, therefore, that industry should undertake the training of young members of the staff, especially those who come direct from school. The Iron and Steel Institute in its report on the training of metallurgists has laid it down that "Apart from statutory requirements, young employees should be encouraged to undertake further study by the granting of reasonable facilities to attend classes during working hours," and that "Works training and apprenticeship schemes are, if possible, of even greater importance in improving the scientific and technical education of younger entrants into industry than of those whose full-time education has been prolonged to a later age."

In the iron and steel industry a number of these schemes are already in existence and they vary considerably in procedure and facilities. In one of the most successful, apprentices are accepted between the ages of 16½ and 18½; they are transferred at regular intervals from one department or works to another, and it is a condition that they shall take certain prescribed evening classes; the total period of training is four years. In another case employees of 17-18 years of age are selected by the management

on the basis of progress at the evening classes of the local technical college and utility in the works. Six months' full-time study at the technical college during the winter is alternated with six months' employment at the works during the summer, with pay, over a total period of three years.

In an interesting paper on the training of craftsmen for the optical instruments industry (*J. Sci. Inst.*, June, 1944) Mr. F. Twyman has proposed that training for industry generally should be done by means of an apprenticeship system, a system which is probably at least 700 years old. He points out that Clause 34 of the new Education Bill says: "It shall be the duty of the parent of every child of compulsory school age to cause him to receive full-time education suitable to his age, ability and aptitude either by regular attendance at school or otherwise." The words "or otherwise," in Mr. Twyman's view, open the way to a scheme of apprenticeship approved by the local authority as a part of the full-time education. He points out that this system is used in other countries. In Russia every high school is a vocational school and there are no higher educational institutions in that country that provide only a general education. In many countries apprentices are required to attend regularly for instruction in a vocational school or class. The usual form of provision authorises the competent authority to require attendance for instruction in prescribed subjects and frequently the hours of instruction are laid down by legislation.

It would appear that industry generally would be well advised to work out suitable schemes of the nature indicated. There could be some weeding out of those who are found unlikely to qualify for the higher grades of employment. It is evident that we must have in industry hewers of wood and drawers of water as well as those who design and operate plant. It will obviously be open to the individual to educate himself and to pay for his education entirely apart from industry, but those who enter industry without anything more than school certificate, or even without that, should be given an opportunity to profit by instruction at least until they are 17 years old. Those who fail to profit would be then utilised in the less important jobs.

NOTES AND COMMENTS

I.C.I. Fellowships

IT is always heartening to see a generally accepted theory translated into practice, especially to an industrial scientist whose objective is the conversion of research and experiment to practical uses. Scientists throughout Britain, and indeed in an even wider sphere, should therefore feel well satisfied to hear of the new I.C.I. scheme for providing no less than 80 Fellowships in scientific research in nine universities in Great Britain. Those to which the offer has been made are the larger metropolitan universities, and those with a close geographical relation to I.C.I.'s main sources of production. Oxford, Cambridge, and London have been offered 12 Fellowships each; Glasgow, Edinburgh, Liverpool, Manchester, and Birmingham eight each; and Durham four. In an informal letter addressed to the respective Chancellors, Lord McGowan explains the intentions of his Board. Convinced that academic and industrial research are interdependent and complementary, they have come to the conclusion that it is useless to expect substantial advances in industry without corresponding advances in academic science. They therefore decided that assistance to research in the universities in a broad and comprehensive spirit was not only necessary to the universities themselves, but would in the long run benefit industry. It is made quite clear that the immediate objective of the scheme is the strengthening of scientific departments in the particular way that each university deems best. Accordingly no conditions whatever attach to the tenure of these I.C.I. Fellowships.

How the Scheme Works

THE subjects laid down are Physics, Chemistry, and the sciences dependent thereon, including Chemotherapy; that is to say, any branch of Physics or Chemistry may be included, as well as applied sciences such as Metallurgy and Engineering. These sciences, indeed, constitute the background of modern industry. The scheme is announced as operating for an initial period of seven years; and the Fellowships will be of the average value of £600 per annum, though universities will have the power to

determine the emolument for each particular appointment and to alter the number of awards. The Fellows will be members of the university staff and will be solely concerned with the duties laid upon them by the universities. Their primary work will lie in research; but they must also take some part in university teaching. The intention is, not to relieve the universities of the cost of maintaining any part of their normal work, but to enable them to add to what they already do; and the ultimate aim is the emergence of a body of men capable of taking high academic or industrial positions, to the great benefit of both academic research and industrial practice. Lord McGowan stresses the point that nothing in his letter is to be taken as an instruction, freedom of action being one of the greatest assets that academic research can possess. It has been taken for granted, however, that appointments will be made without discrimination as to race or nationality; it is also hoped that there will be reasonable co-operation among the beneficiaries, which should help to neutralise the disadvantage of a man spending his whole career at one university. The appointment of a consultative committee will ensure such co-operation, and will help to indicate to the electors the names of men available elsewhere. It is reasonable to assume that if this scheme works well, others may feel disposed to make similar subventions.

The German Chemical Industry

THERE appears to be a general and healthy feeling abroad that something must be done to curb Germany's potentialities for starting preparations for a third world war as soon as the present one is finished. It is inevitable that the news of recent events within Germany should have directed our attention to the possibility that the war is approaching its close; and it is well that we should have some sort of insurance scheme to work on when that happy conclusion arrives. In the *Sunday Dispatch* last week Lord Vansittart outlines a detailed "Plan to make us safe from Germany," and he does not fail to place the German chemical industry in its

proper perspective as an instrument of war. "Disarmament," he says, "is a matter not only for soldiers, but for engineers and specialists in machinery." Following the lead given some months ago by Sir Robert Robinson, he insists on the dismantling of Germany's nitrogen fixation plant. Further, he demands the elimination of her synthetic petrol and synthetic rubber plant, and the transformation and control of her chemical industry in general. Allied supervision must also be applied to the German iron and steel industry. It would be inadvisable to eliminate the German chemical industry altogether, as it must be applied, immediately the war ends, to the production of those raw materials and intermediates which, along with forced labour, will evidently be the chief sources from which the Allies, especially those whose industrial potential has been destroyed wholly or in part, can derive reparation for their injuries. A quick method of ensuring that the chemical industry shall be applied to this purpose would be, as Lord Vansittart suggests, to insist on the surrender of part of the share and loan capital of such warlike chemical combines as I.G. Farben, and the appointment of Allied directors and managers. To guarantee the adequate operation of all these proposals, a numerous and effective Intelligence Service will have to be distributed throughout Germany, keeping a meticulous watch. Such a service, in our view, should include chemists and engineers among its numbers.

In the Occupied Countries

ASIDE issue of some importance occurs as a result of the above observations. In conformity with their policy of gaining control of the entire industry of occupied Europe, the Germans have made many capital reorganisations, and have formed many new industrial combines linking, or rather handcuffing, the technical industries of the occupied countries to those of the Reich. Repeated instances of the process have been recorded in our pages—a typical example is the Francolor dyestuffs trust controlling the French dye industry. It is more than probable that such organisations will be found, at the close of the war, to be the only industrial units that are working effectively; and it will be

a waste of time to break them up at once and reorganise on the old lines. A far more rapid and practical way of dealing with the situation would be for Allied representatives to buy out the German interests in the currency in which the original transaction was carried out—say, in Vichy francs—imposing a rigid time-limit for the completion of the deal. The Germans could hardly object to payment in currency which they had themselves approved; and the Allied purchasing commission would be able to hand over the works, after a period of reorganisation, either to the representatives of the pre-war owners, or to some approved national body appointed by the Government of the country concerned. The suggested scheme would appear to have the merit of poetic justice while at the same time disposing of a large quantity of undesirable currency.

Plastics against Corrosion

CORROSION is a phenomenon which gives the chemical industry no end of trouble. The inertness of certain phenolic plastics, which can be applied to a large number of corrodible surfaces, provides one solution. In this connection an article which appeared in the April issue of *Chemical Industries* is well worth reading. Written by R. L. Norum, of the Bakelite Corporation, it gives details of four techniques whereby protective coats of phenolic plastics can be applied to many metals, including copper, brass, silver, zinc, lead, aluminium and tinplate. Iron and steel, as well as the alloys of cadmium and magnesium, may be protected in the same manner. After a film of resin solution has been deposited it is baked, when it confers a remarkable degree of corrosion-resistance to tanks, pickling vats, pipe lines and so on. It is effective against both mineral and organic acids, and also withstands attack by organic solvents. Relevant to this same problem is a note in this particular journal on the Schori metallising process. All chemical engineers will know how this technique makes it possible to deposit by spraying a protective layer of Thiokol synthetic rubber, and it appears that the method has been widely used during the war to prevent the corrosion by sea water of naval propeller shafts.

Chemicals by Rail

Current Arrangements for Railway Transport

by GRAHAM SAVILLE

Arranging the transport by railway goods service of chemical and allied traffic, one of the first items which must be attended to is the compilation of the consignment note. This is important, as inaccuracies and omissions may cause the trader considerable expense and sometimes extensive inconvenience. There are three types or descriptions of consignment note in general use, these being: (1) Ordinary; (2) Owner's Risk note for damageable goods not properly protected by packing; and (3) Dangerous goods. In addition there are other forms of consignment note in less general use including one which applies to merchandise carried partly by land and partly by water or wholly by water, and another used for returned empties.

The illustration shows the type of

depending on the particular nature of the traffic forwarded. The railway companies are not common carriers of dangerous goods and so the conditions of carriage under which the various classes of dangerous goods are conveyed are printed on each consignment note.

While forms of consignment notes are provided by the railway companies, some chemical concerns will doubtless find it more convenient to use their own form of consignment note. One advantage of doing this is that certain details, such as the sender's name and address, and often the description of goods, can be printed in advance on the consignment note and so save considerable clerical labour. In addition many firms folio their consignment notes with a serial number which the railway company can be requested to

| RAILWAY | | | | | | | | | | Pre. No. | |
|---|--|----------------------------|--|--|--------------------------------------|--|---|---|---------|------------------|--|
| CONSIGNMENT NOTE FOR THE CARRIAGE OF MERCHANDISE (other than Dangerous Goods and Merchandise for which Terms and Conditions are specially provided) BY MERCHANDISE TRAIN subject to the Standard Terms and Conditions of Carriage. | | | | | | | | | | | |
| To the RAILWAY COMPANY | | | | | | Reverse and forward the undersigned Merchandise. Station 19 | | | | | |
| Full Name of Sender | | | | Full Address | | | | In such cases state whether the Merchandise is to be carried at the | | | |
| In certain instances alternative Company's Risk and Owner's Risk rates are available. | | | | Company's Risk rate or Owner's Risk rate | | | | | | | |
| These Goods to be filled in by sender | | | | | | | | | | | |
| Consignment Description of Nature | To what Station to be sent and if to Water Order in case | Consignment | | No. of Packages | Description of Contents and Marks | Weights (including weight of packing) T. C. G. lbs. | State of character (perishable or otherwise) or Consignee's | For Railway Use only | | | |
| | | Full Name and Full Address | | | | | | Rate | Paid on | T. in Ch. per | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Traders are requested when consigning goods "Carriage Paid" to endorse the address initials or initials "Carriage Paid" or "Carriage Paid Basis." | | | | | | | | | | | |
| Name of Company's Consignee | | | | Van number | | Entered by | | | | | |
| Loaded by | | | | State here if Carried by Sender | | | | | | | |

General form of consignment note.

consignment note normally used for traffic consigned under the ordinary company's risk or owner's risk conditions. The second description of consignment note is usually printed in green and covers goods which the railway company is not willing to accept under company's risk conditions because the packing does not comply with their regulations.

There are many varieties of consignment note covering dangerous goods, and these are of special interest to chemical concerns, as many chemicals come within this classification. These consignment notes are printed in brilliant colours, their use

enter against the appropriate entry on their accounts rendered to the trader. It is imperative, however, that chemical firms should indicate on their own consignment notes that they agree to the statutory conditions of carriage for the conveyance of goods by rail.

The Railway Companies' Standard Terms and Conditions set out the particulars which must be inserted on the consignment note, and these are as follows:—

- (1) The full name and address of the sender and the consignee.
- (2) The station or place of destination.

(3) Such particulars as the railway company may reasonably require of the nature, weight (inclusive of packing) and number of the parcels, articles or merchandise handed to the railway company for carriage to enable them to calculate the charges therefor.

(4) Whether (when the railway company does not require pre-payment) the charges are to be paid by the sender or by the consignee.

(5) Where by arrangement with the railway company the merchandise is accepted "To wait order" at any particular station, that the consignment is "To wait order."

Chemical firms will, of course, appreciate in regard to Clause 4 that nearly all merchandise forwarded by them by rail comes within the provision of "The Railways (Carriage Paid) Direction, 1942" and so has to be forwarded "Carriage Paid."

In this connection it is essential to understand the difference between "Carriage Paid" and "Carriage Paid Home." When chemical firms are desirous of paying the carriage charges to the consignee's premises merchandise should be consigned "Carriage Paid Home" or "Carriage Paid to Destination," but when it is only wished to pay carriage within the railway companies' normal delivery areas, leaving the consignee responsible for any cartage charges beyond such areas, the correct method of consigning is "Carriage Paid." It is also necessary that labels should be marked in the same way as the consignment note.

"Owner's Risk" Traffic

It will be seen from the specimen consignment note that provision is made for the sender to state whether the traffic is to be carried at the Company's Risk rate or the Owner's Risk rate. Only certain traffics will be conveyed at Owner's Risk and these are indicated in the Railway Clearing House's "General Classification of Merchandise" by a small letter, ranging from "a" to "h," after the number of the class. When Owner's Risk rates are charged, these represent certain percentage concessions from the Company's Risk rates. Where merchandise is consigned at Owner's Risk but no Owner's Risk rate is in operation, the traffic will be carried at Company's Risk rates. Again, when no indication is given

by the sender as to whether goods are to be conveyed at Company's Risk or Owner's Risk, Company's Risk rates are applied.

Correct Address

In inserting the address of the consignee on the consignment note chemical firms should take care to comply with a war-time regulation. Under this regulation it is now necessary to show on the consignment note and also on the labels the letter and number of the postal district (or where the postal district is indicated by a number alone, the number of the postal district) when the consignee's premises are situated in certain areas. The areas concerned are: Birmingham, Brighton and Hove, Bristol, Edinburgh, Gateshead, Glasgow, Leeds, Liverpool, London, Manchester, Newcastle-upon-Tyne, Salford, and Sheffield. In addition the sender should watch when giving the point of destination on the consignment note that full information is shown including the counties, as there are many villages and towns of the same or very similar names. Newcastle is a good illustration of this as there is a Newcastle-upon-Tyne in Northumberland, a Newcastle-under-Lyme in Staffordshire, not to mention several others.

Chemical concerns under certain conditions may wish to forward merchandise by a specific railway company or by a specified route, where alternative routes are available, or to a particular station in a town, and this fact should be clearly indicated on the consignment note as well as shown on the labels.

Special instructions such as "Deliver on Wednesday, July 5" should not be inserted on the consignment note as the railway companies will not accept traffic under such conditions. General remarks such as "Urgent" are, however, permissible.

Accurate Description

The description of the goods is one of the most important factors involved in compiling the consignment note. This information forms the basis on which the railway company assesses the charges for carriage, and an inaccurate description may cause a higher rate to be charged than is properly applicable. Chemicals fall in numerous classes; for example, chemicals (not dangerous, corrosive nor

explosive) vary from Class 18 to Class 20. Should therefore a cask of chemicals be consigned as a package Class 20, the rate applicable to that class will be charged, even if the goods belong to Class 18.

The trader may, if he desires, require the railway company to sign an acknowledgement of the receipt of the goods, but such a document cannot be used as evidence of the condition or of the correctness of the declared nature, quantity, or weight of the consignment at the time it was received by the railway company. It will often be found that a duplicate of the consignment note is a suitable form on which to obtain this receipt.

Another important feature in the compilation of consignment notes again concerns charges and this is to indicate that consignments are to be "part-lotted" when applicable. The method usually adopted is merely to state on the consignment note "Part lot where applicable," since by so doing considerable economies are effected in transport charges by the elimination of Small Parcels Scale premiums and the obtaining of reduced charges from lower classification and rates.

Labelling Methods

Chemical concerns when forwarding traffic by railway goods service will find it necessary to comply with the recently amended labelling instructions for general goods. When a consignment consists of from one to ten packages all must be fully labelled; when there are eleven to one hundred packages one in every five—with a minimum of ten—must be labelled. If there are over a hundred packages, one in every ten, with a minimum of twenty. In addition, all packages which are not required to be fully labelled under these regulations must bear the consignee's name and destination town. Many chemical firms will find it more convenient in practice to label all such packages with the full name and address of the consignee.

It should be appreciated that with chemicals that come within the railway companies' definition of dangerous goods, all packages must be labelled and certain other information inserted on the labels. This includes the name of the contents as defined in the classification and also appropriate wording such as "Explosive," "Highly Inflammable," "Bisulphide of Carbon—Highly Inflammable," etc.—the

actual wording depending on the regulations regarding the particular commodity. The labelling regulations do not apply where merchandise is forwarded in full truck-loads, but the railways have requested that a few packages near the wagon doors should bear the sender's or consignee's full name and address.

Most large chemical concerns have their own private railway sidings, and load traffic from them. There are wagon labelling arrangements operating in respect of such traffic which should be understood. With ordinary traffic, unless it has been otherwise agreed in writing between the trader and the railway company either generally or in respect of a particular consignment, the trader must label each truck with two labels. These must be securely affixed one on each side of the wagon (there is normally a clip on the wagon for this purpose), and each label must give the following information: (a) The name of the sender; (b) The name of the consignee (except where the truck is loaded with merchandise for more than one consignee); (c) The station or place of destination and, where such station or place is served by more than one railway company, the name of the delivering railway company; (d) The nature of the merchandise; (e) The actual weight, or where this is not practicable, the approximate weight, of the merchandise (inclusive of packing); and (f) The name of the owner and the number of the truck. Again with dangerous goods the wagon must be marked appropriately, e.g., "Inflammable," "Dangerous if not kept dry," etc., by means of a separate label or other equally efficient means.

Nominated Loading

All chemical concerns should be aware of a special war-time arrangement known as "nominated loading." This system applies to a considerable number of stations, and places restrictions on the forwarding of traffic to various points. For example, station "Z" may forward to station "A" and "B" on Mondays and Thursdays and to stations "C" and "D" on Tuesdays and Fridays; the railway company will not accept traffic tendered on the wrong days. Chemical firms have therefore to watch these arrangements as they affect their own areas, and in addition they must comply with the special embargoes placed by the

railway companies on the movements of goods traffic for military and other reasons.

Demurrage

Closely allied with despatching arrangements is the subject of demurrage. The shortage of railway wagons often causes delays and inconveniences in forwarding and it is essential for wagons to be loaded and unloaded with the minimum of delay in order to assist the war effort. The importance of the problem of wagon demurrage has been further increased by the higher war-time charges, reduced free periods, and certain new developments in the method of assessing charges.

In the first place an agreement reached between the Trader's Co-ordinating Committee, the Ministry of Transport, the Railway Executive, and the Railway Managers is of particular interest to chemical concerns as it outlines various circumstances which may be taken into account in requesting relief from demurrage penalties. The points set out in the agreement are : (1) Advice Notes or Orders delayed or lost ; (2) Disputed dates in connection with loading and unloading of wagons, etc. ; (3) Failure of firms' working arrangements owing to strikes, enemy action, breakdown of machinery, or other exceptional circumstances outside a trader's control, etc. ; (4) Wagons received at destination in larger numbers than can be dealt with by the trader within the free period, owing to transit irregularities ; (5) Extreme stress of weather, causing delay in loading or unloading ; (6) Delay to loaded wagons awaiting sheets or ropes, or to sheets or ropes awaiting wagons ; (7) Making up train-loads or special consignments at the request of the railway, leading to delays at forwarding or receiving ends ; (8) Traffic transferred to storage yards or alternative accommodation, or received at destination which the consignee is in a position to accept, but which the railway companies cannot deliver ; (9) Demurrage incurred owing to the refusal of the railway company to accept loaded wagons owing to traffic or other restrictions ; (10) Export or import shipment traffic delayed ; (11) Cancellation of contracts owing to emergency ; (12) Difficulties in obtaining cartage or motor vehicles, owing to the commandeering of vehicles by Government or Local Authorities. It should be understood that such com-

mandeering of vehicles qualifies Clause 12 only if it occurs between the ordering of the goods and the expiry of the free period for their discharge.

Traders will find that the points outlined above cover the majority of exceptional circumstances which cause delay in the release of wagons and sheets. While these particular points have been instanced it does not prevent the chemical or any other industry from putting forward as grounds for relief from demurrage charges any circumstances peculiar to their own industry.

Free Periods

Certain free periods are allowed before demurrage charges are raised. For loading, one clear day is allowed exclusive of the day the wagon is placed at the trader's disposal ; for unloading, one clear day exclusive of the day of receipt by the trader of the notice of arrival of the wagon at station, one day after the wagon is placed at the trader's disposal at private sidings, or one day after arrival at ports in the case of shipment traffic. A day is usually considered to be the 24 hours beginning at 6 a.m., and Sundays and Bank Holidays are not included.

The charges made for demurrage vary according to the type of wagon and several other considerations ; the main charges are :

For railway companies' wagons (including private owners' requisitioned wagons), with the exception of those used for the conveyance of coal, coke or patent fuel, or of iron ore, ironstone, lime or limestone for blast furnaces and steelworks.

(a) *High Capacity Wagons.*

Above 16 and not exceeding 20 tons, 8s. per day.

Above 20 and not exceeding 30 tons 12s. per day.

Above 30 tons, 35s. per day.

(b) *Specially Constructed Wagons.*

Above 15 and under 20 tons, 12s. per day.

Above 20 tons and under 30 tons, 25s. per day.

Above 30 tons and up to 60 tons, special arrangement.

(c) *Refrigerator and Insulated Vans.*

25s. per day.

(d) *Other Wagons.* 6s. per day.

The charges on railway companies' wagons (including private owners' re-

quisitioned wagons) when used for the conveyance of coal, coke, or patent fuel, are :—

(1) Before conveyance at stations, depots, ports, docks, wharves, and private sidings other than colliery sidings (except wagons referred to in 3), 3s. per day.

(2) After conveyance at stations, depots, ports, docks, wharves, private sidings, and barging places (except wagons referred to in 3), 3s. per day.

(3) Before or after conveyance :—

(a) In the North-Eastern Area of the L.N.E.R. and in Scotland,

(i) Wagons exceeding 16 tons and not exceeding 20 tons, 4s. per day.

(ii) Wagons exceeding 20 tons and not exceeding 30 tons, 5s. per day.

(iii) Wagons exceeding 30 tons, 10s. per day.

(b) On the Southern Railway.

Wagons of 20 tons, 4s. per day.

The charges given above are per wagon for each day or part of a day after the expiry of the free period.

Records of Loading

In order that a close watch can be kept on the time taken for wagons to be loaded and cleared and that an accurate check can be made on demurrage charges, records of the loading and clearance of wagons should be compiled. For clearance purposes at private sidings it is suggested the details set down should include : (1) Wagon number and owner ; (2) Sender of the wagon ; (3) Forwarding station ; (4) Date advice received ; (5) Date demurrage began ; (6) Date wagon unloaded ; (7) Date wagon reloaded ; (8) Demurrage charges ; (9) Explanation.

Many chemical firms will find it convenient to extend the records outlined to cover the payment of carriage charges against each particular wagon and also to ensure that all appropriate rebates are received. The value of any system of recording the loading and clearance of wagons will be increased if entries are made currently from telephone calls, advice notes, and actual listing of wagon numbers.

Should a firm be of the opinion that any of the conditions previously referred to for relief from demurrage charges have not been observed in their own case, they have a right of appeal to the Special

Demurrage Committee of the Railway Executive Committee and ultimately, should they so desire, to the Minister of War transport.

Standage Scheme

A scheme recently introduced which is finding considerable favour among traders is a standage arrangement for demurrage. It is of special interest to firms having a continuous inward bulk traffic and was first applied to blast furnaces and chemical works. The scheme avoids the necessity for keeping a record of each wagon, as wagons are dealt with in bulk and the trader is allowed credit for wagons unloaded before the expiry of the free period.

The method of operation is as follows : a daily census of wagons is taken at a time agreed between the trader and the railway company. The trader gives details of the total number of wagons on hand in his sidings loaded, the total number of empty wagons supplied to order during the 24 hours, the total number of loaded wagons discharged, and wagons loaded and labelled ready for the railway company. At the same time the railway company obtains details of the loaded wagons standing outside the works which the trader is unable to accept. To cover the week-end, Saturday's figures cover a period of 48 hours from the agreed time on Saturday morning to Monday morning. At the end of the week a balance is made between the total wagon-days of wagons standing with inward loads, empty wagons supplied, and wagons under load but not available for despatch on one part ; and inward loaded wagons discharged and outward loaded wagons at the railway company's disposal plus an allowance of one-third on the other part. Charges are then raised at an agreed rate per day on the excess standage represented by this balance. The railway companies estimate the agreed rate per wagon per day by taking a test over a representative period. These arrangements are limited to wagons of capacity of 21 tons and under ; wagons of from 15 to 21 tons are counted as 1½ wagons.

Chemical firms will appreciate that this scheme saves considerable clerical labour both in recording and in correspondence over adjustment of demurrage ; it also enables the trader to deal with wagons to suit his own convenience.

Scientific Research in Eire

Work of the Emergency Bureau

THE yearly supply estimate for the Eire Emergency Research Bureau was reduced to £19,250 from last year's figure of £32,850 at a recent sitting of the Dail. Mr. De Valera explained that this reduction was due mainly to the transfer to the Turf Development Board of the work on the production of charcoal at Turraun. Turraun, he stated, was producing 20 tons of high-grade charcoal per week. The problem relating to the recovery and utilisation of the by-products of carbonisation was occupying attention, while examination of the manufacture of charcoal in hand-operated kilns continues.

Potassium Chlorate

As a consequence of the uncertainty with regard to the imports of explosives, possibilities of the domestic manufacture of potassium chlorate had been studied, and large-scale arrangements for its production at an early date had been made. A full-scale plant for the production of ether from alcohol had been erected; investigations were being made to purify the ether and render it suitable for medical purposes.

Fertilisers

Under the head of chemical industrial investigations indications were given with regard to fertilisers, superphosphates, sulphuric acid, liquid glue and other adhesives. Consideration had been given to the production of calcium metaphosphate for fertilising purposes, while to produce and improve phosphatic fertilisers the Bureau had carried out experiments on a semi-commercial scale in connection with the heat treatment of Clare phosphatic rock, either alone or with sodium carbonate of lime. Better use of Avoca pyritic ore in the production of sulphuric acid, required in the manufacture of superphosphate, was also being studied. Investigations were in progress with respect to home manufacture of adhesives for various industrial purposes including boot manufacture. Formulae had been developed for liquid glue, for adhesives to be used with cellophane, and an adhesive for abrasive papers.

Organic Solvents

Attention was being given to the possibility of improving methods for acetone production, and processes were being developed for the preparation of butyl and amyl acetate, as well as other organic solvents for industry. Experiments in the manufacture of sodium hypochlorite solution were expected to provide against the failure of imported supplies for local

authorities and creameries. Investigations were being pursued concerning the properties of peat, tar and substitute materials for use in polishes, and certain supplies needed by the boot industries had been obtained thereby.

The Emergency Research Bureau had also co-operated with the Government in examination of such subjects as the drying of potatoes for pig food, the dehydration of vegetables, and economy in lubricating oils. The number of problems put by industrial firms continued to grow, which proved that the value of scientific advice and assistance was being ever more appreciated.

A variety of minor investigations included the resilvering of mirrors for cinemas; the manufacture of axle and cart greases; and the production of sewing wax and of a thread lubricant for the boot industry. A spectrographic apparatus for the analysis of alloy steel had proved its value in identification of steel samples. Work on the production of ferro-silicon required by foundries had been brought to the semi-commercial scale, but in view of the improvement in the supply position, trials of the process on a commercial scale were not justified.

Irish Penicillin

It has just been announced that two young Dublin chemists, Dr. Oliver Roberts and Dr. Diarmuid Murphy have produced penicillin in the Botanic Section of the College of Science, after two months of experimentation carried out under considerable difficulties. Agar for the purpose of mould culture is now easily obtainable in Ireland, as a result of the initiative of the Emergency Research Bureau which saw the importance of this substance two years ago. Dr. Roberts and Dr. Murphy are producing fresh supplies of penicillin weekly, and although they have as yet no staff of skilled collaborators to aid them, the Medical Research Council has ensured the continuance of the work for the remainder of the year. A limited quantity of sodium penicillin is to be released by the U.S. Government for civilian use in Eire, stated the U.S. Minister to Eire this week.

Swedish charcoal production has more than doubled in the last five years, mainly to meet the demand for fuel for the country's producer-gas vehicles, which now total about 70,000. The Swedish Fuel Commission estimates that in 1943 well over 5,000,000 cu. metres of charcoal was prepared, 60 per cent. of which went to producer-gas traction, the remainder being consumed in steel manufacture.

Practical Emulsions*

A Survey of Present-Day Uses

by HENRY A. GOLDSMITH

THERE are only a few obvious models for emulsions in nature. Milk, of course, has been known to man for many thousand years. From its behaviour he learned much about emulsions that was later found capable of generalisation. Coagulation (that is, breakdown), "creaming" (that is, gradual separation under the influence of gravity) and inversion (to butter), all studied on milk, are general emulsion phenomena. Other natural and semi-natural emulsions—produced by human manipulation—were gradually studied. These include rubber latex and other milky saps, butter, unwanted emulsions of brine in petroleum oil, and the annoying emulsions in ether-extraction.

Advantages of Dispersions

To-day, we use many materials, such as fats and oils, waxes, resins, solvents, and solutions of many water-insoluble materials in an emulsified form. There are various reasons for the manufacture of these emulsions. The most important is simply the fact that water is, and probably always will be, our cheapest solvent. It is more economical to use a water-immiscible material dispersed in water by means of a small amount of emulsifying agent than to apply it dissolved in a comparatively large amount of a more expensive organic solvent; this is particularly true where the solvent is to be volatilised after or during application. Another reason is that very often it is advantageous to emulsify a material for use. Sometimes it is not possible to obtain the desired result by any other means than by emulsifying a material. Cod-liver oil, castor oil, and mineral oil are made more palatable as medicinals by emulsifying them in water or flavoured water-solutions. Similarly, it would be difficult to obtain as fine and lustrous a wax polish by any other way than in the emulsified wax-polish form. Just as with rubber latex, synthetic rubbers and synthetic resins may be applied conveniently and easily from artificial dispersions of these materials in water. A third reason for the use of emulsions is the desire for novelty. Thus, mayonnaises, icings, custards, etc., were originally introduced as new ways to tickle the palate. Cold creams, vanishing creams, hair creams, lotions, and other cosmetic preparations are the result of a constant search for novel products. Very often such novelties will introduce a genuinely superior product with

different properties from those of the more conventional original. For instance, when nitrocellulose lacquers are applied in emulsified form, they penetrate paper much less deeply than the usual non-aqueous lacquers would. Solvent solutions have higher flash points than the corresponding solvents, making them safer to use. Cold creams represent a vast improvement over the old-fashioned greasy make-ups. The "rubless" polish represents a great step forward over the old type of solvent polish. Leather treatments have been greatly improved and speeded up by emulsion fat-liquoring, and many textile and metal-working operations are to-day almost inconceivable without the use of self-emulsifiable lubricants. Another reason for the use of emulsions has been that it is possible to carry out certain chemical reactions conveniently this way if immiscible reagents are used. Thus, synthetic rubber monomers are best polymerised by bringing them into contact with water-soluble polymerisation catalysts in an emulsified form.

Technique of Emulsification

Emulsions are systems in which one liquid phase is dispersed in the form of globules within another liquid phase with which it is more or less immiscible. The liquid which is broken up into globules is called the internal or dispersed phase, while the other one is referred to as the external or continuous phase. In practical technical emulsions, a third ingredient, the emulsifying agent, must always be added to obtain a satisfactory product. Most emulsions produced have, as one of their phases, water or aqueous solutions, and therefore, according to whether water is the dispersed or the continuous phase, we distinguish W/O (water-in-oil) and O/W (oil-in-water) emulsions. The term oil must here be considered as including any water-immiscible chemical or composition used in this connection.

In order to obtain a useful type of emulsion, with sufficiently small particle size, sufficient stability, and the right kind of viscosity, many factors must be taken into consideration. One of them is the order and method of adding one phase to the other. In general, the intended continuous phase is introduced first, and the dispersed phase is added to it usually in small portions, in a thin stream, but sometimes all at once. There are various schools of thought as how to introduce the emulsifier; and all have their merits. It may be added

* From a lecture delivered to the American Society of European Chemists and Pharmacists (A.S.E.C.)

to the oil phase, or to the water phase at once or in small portions, or it may be made *in situ* as, for instance, by adding an alkaline water solution to a fatty-acid-containing oil phase.

Correct Agitation Needed

Some authorities believe that alternate additions of water and oil will give superior emulsions. In any case it is advisable to have a high initial concentration of emulsifier. Another important factor is the choice of the proper type of agitation. Some emulsions can be made by merely waving a stick back and forth through a mixture, but usually it is necessary to provide for more or less powerful stirring to get adequate stability and particle size. There are many machines available for this purpose. There are mortar and pestle, egg beaters, Waring blenders, high-speed stirrers, and various types of violent homogenising machines and colloid mills. Here, too, no general approach can be made, as some materials will give satisfactory results with violent agitation, others only with slow agitation. In a general way, it can be said that those emulsifying agents which impart low interfacial tension to their systems need little agitation, while the opposite is true for those materials where high interfacial tension exists.

The most important consideration in making a satisfactory emulsion is the proper choice of emulsifier. This is, in fact, an extremely difficult matter, because the number of possible emulsifying agents is enormous, and the available literature on the subject is somewhat incomplete. It may be enough to say that there are two fairly distinct types of emulsifying agents. The first group comprises the so-called hydrophilic colloids, such as the proteins, gums, mucilages, a group of materials having little, if any, surface-tension lowering effect, and requiring considerable agitation to produce emulsion. Owing to their colloidal characteristics, however, the resulting emulsions are often very stable. The second group consists of the soaps, the sulphated oils, and the many varieties of colloidal electrolytes, commonly grouped together as surface-active agents. These materials lower the interfacial tension between the emulsified phases very considerably, thus promoting easy emulsification, but it is almost impossible to predict what may be expected with regard to fineness, stability, and phase of the resulting emulsion. A sub-group of this are the heavy metal soaps, which are best known as stabilisers for W/O emulsions.

Stability

There are some emulsions, such as those used as insecticides or agricultural sprays, where great stability is undesirable. There

are other emulsions again, such as shortening, margarine, and cosmetic creams, where relatively poor emulsifying agents may be used, because the product of emulsification is no longer liquid, and therefore separation is greatly delayed. However, for the majority of liquid emulsions, stabilisation must be good enough to keep the emulsion unchanged for many months. There are two forms of instability most frequently encountered in emulsions. The less dangerous type is caused by "creaming," that is, by separation under the influence of gravity, and is speeded by low viscosity and large difference of density. "Creamed" emulsions can often be re-emulsified by mere shaking. The more serious type is caused by actual breakdown, that is, the separation of the coalesced droplets of the dispersed phase: a result of unsatisfactory emulsifiers, too large particle size, poor formulation, or poor stirring. A broken emulsion can usually not be re-emulsified easily.

It may be well to state that the choice of emulsifying agent, in spite of the large variety of available types, can often be narrowed down to comparatively few by considering logically what they must and must not do. Some will be ruled out at once for purely economic reasons, such as cost or lack of suitable equipment. Others may be ruled out because of smell, taste, or colour, or because of toxicity or pH. This leaves only considerations pertaining strictly to the emulsification process itself, it being left to the chemist to decide what material or combination will be best for obtaining stability in storage, in hot and cold weather, and against freezing and boiling or the effect of chemicals.

Specific Uses of Emulsions

An effort has been made to assemble a short survey showing the use of emulsions for various industrial purposes. There is a large variety of them and it is not likely that this list will be by any means exhaustive. Cosmetics, as the most extensive use, may be considered first. While the preferred emulsifying agents in this industry have been soaps in various forms, numerous other materials have also found use here. Any brief study of journals dedicated to this subject will reveal the most ancient emulsifiers, gums and mucilages, used side by side with modern synthetics of all types. Texture, whiteness and sheen, low pH, and the proper amount of body are important considerations. Another cosmetic problem frequently encountered is that of finding emulsifiers stable to various salts and medicinal substances, such as tannic acid, oxy-quinoline sulphate, aluminium chloride, ichthyol, or mild acids. Another problem is that of good colour stability. For instance, some of the best emulsifiers, the

triethanolamine soaps, cause discoloration of their products on storage.

A group closely related to this is that of medicinal emulsions. For this purpose, emulsions have been made up for centuries under the name of salves and ointments. Methods have been fairly "non-industrial" until recently, and the equipment has been primitive. Many emulsions were made up purely by trituration of emulsifiers with oils by mortar and pestle, and by working water in subsequently. Salves were obtained by means of lanoline, and more recently by absorption bases, and are W/O emulsions. However, modern developments of the pharmaceutical industry have introduced many new requirements and many new ingredients. Thus, the public now uses, in emulsion form, such principles as vitamins, sunburn preventives, anthelmintics, and drugs such as benzocaine or sulphanilamide. Emulsions of cod-liver oil, castor oil, and mineral oil are well known. Emulsifiers for medicinal and pharmaceutical use are naturally restricted to non-toxic, non-irritant, and often edible materials. Thus, gelatin, gums, proteins, lecithin, and sterols are used frequently, but certain modern synthetics such as monoglycerides, fatty alcohol sulphates, sulphated oils, or hexitol esters, may be used; and soaps are used quite frequently. Other less known emulsifiers are the bile salts.

Edible Emulsions

Emulsions make an ever-increasing appearance among our food products, such as shortenings, margarine, dressings and mayonnaises, and butter. All these products represent W/O emulsions utilising a variety of emulsifiers such as the monoglycerides and polyglycerol esters (for shortenings and margarine), lecithin, casein, and egg protein, as well as gums, mucilages, starch and dextrine, and mustard (for dressings, etc.). Other emulsions are less obvious. Some of them are consumed in bakery and confectionery products, e.g., butterscotch, icings, whipped-cream substitutes, ice-cream, and certain dessert dishes. Gums, starch, and milk-powder are utilised for these. Finally, malted-milks and lemon drinks are also emulsified products; and these again are stabilised by gums.

Emulsions in Industry

By far the greatest variety of emulsions, however, is used in industry. Thus, in the textile and leather trade, lubrication during operations and softening of the finished product are obtained by treatment with oil emulsions, such as fish oils and rapeseed oil, or mineral oil in the treatment of leather (fat-liquoring), or mineral oil and olive oil for textiles. For textile operation the soluble oil type of emulsion is of considerable importance. Such oils are

really emulsions without water, serving to protect and lubricate fibres and threads during spinning and weaving, and ready to be washed off at once on coming in contact with water. Many chemicals in emulsified form are applied to the fibre. Thus, waterproofing is carried out with paraffin emulsions, sizing with wax, tallow, or resin emulsions; other emulsions prevent static charges, carry temporary dyes, treat the fibre with solvents, give it lustre, and full it, scour it, or rot-proof it, the choice of emulsifier being strictly tied to performance requirements. While the ever-present gums, proteins and soaps find use in sizings, other problems demand more specialised emulsifiers. Thus in waterproofing with paraffin emulsions it is necessary either to use irreversible emulsifiers, such as gelatin, or to precipitate the emulsifier on the fibre when the paraffin has been deposited. The latter method requires a two-bath process. Sulphated oils are used abundantly, as they themselves act like a combination of emulsifier and dispersed oil. Where electrolytes, hard water, or acid or alkali concentrations are encountered, synthetic emulsifying agents are often most useful.

Protective Coatings

Emulsions have also been introduced into the protective coating field. Here the advantage of emulsification usually offers a considerable saving in solvent cost, and sometimes superior applicability. In this group may be mentioned paint and varnish emulsions, that is, drying oils and solvent thinners, emulsified, and with or without pigments; lacquer emulsions and synthetic-resin emulsions, which may be subdivided into those containing volatile solvents, and those without them. Such emulsions should not contain more than a minimum of emulsifying agent, and its presence should not interfere with the transparency and water-resistance of the resulting film. For emulsions of this kind, some of the better known wetting agents, like the sulpho-succinates and the fatty alcohol sulphates are well suited if blended with a hydrophilic colloid.

BENDING COPPER TUBING

A U.S. copper processing company has developed an alloy which makes it possible for copper tubing to be bent to exact shapes without danger of breaking or collapsing at the bends. This alloy, called Cerrobend, has a melting point of 1580° F. The tube is filled with the molten alloy which, upon solidification, expands and fills all the small imperfections in the tubing. When the bending operation is completed, the alloy is removed simply by immersing the tube in hot water.

Total Synthesis of Quinine

Full Details of Historic Discovery

THE total synthesis of quinine, an achievement which we reported without details in a recent number, is described by R. B. Woodward and W. E. Doering in *J. Amer. Chem. Soc.*, 1944, 66, 5, p. 849. The principal stages of the synthesis are as follows.

7-Hydroxyisoquinoline was converted through its 8-piperidinomethyl derivative into 7-hydroxy-8-methylisoquinoline. Hydrogenation over platinum oxide to 7-hydroxy-8-methyl-1,2,3,4-tetrahydroisoquinoline, and acetylation gave *N*-acetyl-2,7-hydroxy-8-methyl-1,2,3,4-tetrahydroisoquinoline. Further hydrogenation over Raney nickel led to a mixture of stereoisomeric *N*-acetyl-7-hydroxy-8-methyldecahydroisoquinolines, which was oxidized directly to the corresponding *N*-acetyl-7-keto-8-methyldecahydroisoquinolines. From the latter, the pure *cis*-*N*-acetyl-7-keto-8-methyldecahydroisoquinoline (*cis* refers to the mode of locking of the rings) was isolated as the crystalline monohydrate and converted by ethyl nitrite and sodium ethoxide to *N*-acetyl-10-oximinodihydrohomomeroquinene ethyl ester.

Reduction of the oximino-ester to the corresponding amine, complete methylation by methyl iodide and potassium carbonate, followed by alkali treatment of the resulting quaternary salt gave *dl*-homomeroquinene isolated as the *N*-uramido derivative. The free *dl*-homomeroquinene obtained on cleavage of the uramido group was converted by esterification and benzoylation to *N*-benzoylhomomeroquinene ethyl ester.

Rabe's Work

Condensation of the latter with ethyl quinate, following the general methods elaborated by Rabe (*Ber.*, 1918, 51, 1360; *ibid.*, 1919, 52, 1842), working with related natural materials (*cf.* Prostenik and Prelog, *Helv. Chim. Acta*, 1943, 26, 1965), gave *dl*-quinotoxine. The racemic alkaloid was resolved through its salts with dibenzoyl-*d*-tartaric acid. The pure synthetic *d*-quinotoxine dibenzoyl-*d*-tartrate had m.p. 185.5-186°, and showed no depression in melting point on admixture with a sample of authentic material prepared from natural quinotoxine. The synthetic *d*-quinotoxine regenerated from the salt was a very pale yellow viscous oil, $[\alpha]_D + 43^\circ$. Conversion of *d*-quinotoxine to quinine was first effected over twenty-five years ago by Rabe (*Ber.*, 1918, 51, 466), working with natural materials, during the course of his elegant work which resulted in the determination of the correct structures of the cinchona alkaloids.

This work was undertaken as a research project of the Polaroid Corporation. Dr.

Robert Woodward, who is instructor in organic chemistry at Harvard University, has been chemical consultant to Polaroid since 1942, and his collaborator is now instructor in organic chemistry at Columbia University. The two scientists, reports *Chemical and Metallurgical Engineering*, took less than 14 months to complete this research. The director of research of the Polaroid Corporation has stated that it has not been determined whether the intricate process involved in this synthesis can be made commercially practicable, adding that his company does not itself plan to make the product but will license the process.

New British Standard

Sampling and Testing Gelatines

A NEW edition of B.S. 757—Methods for Sampling and Testing Gelatines—has been published, giving detailed instructions in all the relevant matters likely to come before the public analyst or the works chemist concerned with gelatine. The first edition in 1937 was well received. It was the first time in this or any other country that full agreed methods had been worked out. Since that time the methods have been kept in continuous review, and the new edition shows some useful improvements.

Instructions for bulk sampling have been incorporated, whereas, before they were published separately. In describing the sulphur dioxide and arsenic tests, two alternatives have been set out in full—one for arbitration purposes and a simpler one for limit tests. The temperature of the viscosity determination has been raised from 40° to 60° C. in order to bring it in line with American practice, and the result is expressed in centistokes so as to avoid a density determination—a saving in time which the analyst will appreciate.

The relative method of determining jelly strength, *i.e.*, by reference to an agreed sample, is maintained, but for those occasions where there is no agreed sample and the Brook instrument must be used, the analyst will be helped by the introduction of much more detail in technique in order that he may be assured of following the original American method. The soaking time is reduced from overnight to three hours, as here also a considerable saving of time is justified, because the grist of the laboratory sample is $\frac{1}{2}$ in. mesh and it therefore swells quickly.

Copies of B.S. 757 may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1 (3s. 6d. post free).

Oil and Colour Chemists' Association

Annual General Meeting

THE annual general meeting of the Oil and Colour Chemists' Association was held at Stewarts Restaurant, Victoria, London, on July 21. The president, Mr. W. Esmond Wornum, was in the chair. The president made a statement with regard to the reconstitution of the Council and the revision of rules, and explained that this question arose out of the memorandum he addressed to all the members of the Council last December, in which he expressed the view that, with the growth of the sections, the membership of the Council was increasing rapidly and he felt that the Council might soon become too cumbersome. If that viewpoint were accepted, ways and means of reducing the size of the Council would have to be considered. He had no preconceived ideas as to the best method to follow, for he wished to be guided by the views of individual members of the Council and by the Section Committees.

Reconstituting the Council

Mr. Wornum then gave an account of the steps taken by the Council in this connection, and he gave some details about the analysis of the replies received to the circular letter of June 5. The figures showed that 78 per cent. of those who voted—404 out of 537 papers sent out—were in favour of the Council's proposals. While this figure was amply sufficient for the Council to carry its proposals into effect, it was realised that there was no yardstick with which to measure the degree of enthusiasm for the proposals or the extent to which equal support might have been given to alternative proposals, and it was unanimously agreed that decision on this matter should be deferred.

Before concluding his statement, the president said he felt it necessary to make an observation. It seemed unfortunate, he said, that people who had devoted so much time and space to writing comments on this issue in the technical Press should not first of all have studied carefully the points on which their arguments were based, and thus avoid misinterpretation of the facts. It had been stated that a purely federal system, such as had been proposed by the Council, opened up the possibility of the Executive falling into the hands of a caucus which it would be impossible for the members to remove, and that very strong support for this view was given by the Council's recommended amendment to Rule 10. This recommendation gives "The Council power to waive the proviso (whereby sectional representatives on the Council retire annually and cannot hold office for more than two consecutive years) in such circumstances as

it deems desirable in the interests of the Association," but Mr. Wornum said that this power was designed to enable the Council to accommodate distant sections, such as the Scottish Section, very few of whose members had the opportunity of travelling to London or wherever the post war Council meetings might be held. He could conceive of no president or Council using such power unless they were satisfied that a strong case existed for removing the proviso and in no circumstances could that rule be used to enable any Council to vote itself indefinitely into power. The president, vice-presidents, and chairmen of sections were all subject to the two-year rule, and in no case could this be waived by the Council under the proposed amendment to Rule 10 or by any other rule in force or contemplated. Neither he nor any member of the Council would be a party to any scheme or federal structure which would enable the Association to be run by a caucus. It should not be necessary for him to make this statement, but such wild statements as he had cited could not be allowed to pass unchecked. The issue concerned democratic realism on the one hand, and a practical and businesslike materialism on the other.

Finally, the president said the Council felt the time was now opportune to draft a new and complete set of rules which should meet the requirements of the Association for many years to come, and not need constant future alterations. As the provision of new rules must be closely linked up with the reconstitution of the Council, members would naturally be given every opportunity for free discussion of these proposals. This would be a matter for the decision of the new Council.

Postal Ballot Proposed

There was some general discussion of the president's statement, and Mr. N. Fisk moved a resolution, which was seconded, to the effect that the president should be elected by postal ballot and that not more than 12 members of the Association could make nominations for the presidency. Mr. A. J. Gibson (hon. organising secretary) suggested that the best procedure was for this proposal to be put to the sectional committees for consideration, whose views would be conveyed to the Council in a constitutional manner. Mr. H. D. Bradford moved an amendment which was a direct negative, and this also was seconded. Mr. G. Copping pointed out that the attendance at this meeting was a very small one and quite unrepresentative of the Association

membership as a whole. He suggested, therefore, that a vote should not be taken but that the matter should be dealt with as Mr. Gibson had suggested. Mr. W. Garvie seconded this proposal, which was then unanimously agreed to.

Annual Report

The annual report of the Council was then presented. It recorded another year of gratifying progress, notwithstanding war conditions, and referred to the inauguration of the Bristol Section in June, 1944, as well as to the virility of the young sections in Hull and Newcastle-on-Tyne. With regard to the Technical Advisory Council, which served a valuable purpose in the early months of its existence, it is stated that its usefulness to the war effort has been less marked during the past year, largely because the technical side of the industry had become well organised, and many of its former difficulties were overcome. The Technical Advisory Council now had before it the examination of a peace-time problem, *viz.*, the extent to which madder lake can be still regarded as a satisfactory standard for light-fastness in view of the fact that many colours are now available which easily surpass it in light-fastness properties. The adoption of new standards, or a range of standards in a series of different hues, is regarded as a matter of considerable importance to the industry.

Reference was also made in the report to the work of the Technical Education Committee, and it was pointed out that everything in this connection now depends on the active interest of industry which, in turn, depends on the formation of an informed body of opinion within industry. A second report on Technical Education was published during the year, and the proposed apprenticeship scheme aroused a good deal of interest. Assurances have been given that committees will shortly be set up in the three main industries—paint, printing and colour—to explore the possibilities of the early application of this scheme, as a preliminary to bolder steps being taken for the higher technical education of chemists in these and kindred industries.

The total membership at June 30, 1944, was 974, compared with 957 in 1943. The accounts showed a small surplus, and £300 had been added to investments.

New Officers

The following officers were elected: *President*, Dr. H. W. Keenan; *vice-presidents*, Mr. G. A. Campbell, Mr. H. Clayton, Dr. L. A. Jordan, Mr. T. Drummond Kerr, and Mr. S. K. Thornley; *hon. secretary*, Mr. A. J. Gibson; *hon. treasurer*, Mr. G. W. Read-Baker; *hon. editor*, Mr. G. N. Hill; *research and development officer*,

Mr. S. G. Tinsley. Members of Council nominated by the Sections were Mr. V. C. Thompson (Bristol), Mr. Norman Mayfield (Hull), Mr. David E. Roe (London), Dr. H. A. Hampton (Manchester), Mr. G. Weatherston* (Newcastle-on-Tyne), Mr. J. Milligan (Scotland).

The following members of Council were elected by ballot: Mr. G. Copping, Mr. P. J. Gay, Dr. J. J. Sleightholme, Mr. F. Sowerbutts, Mr. H. A. Idle, and Mr. R. J. Ledwith.

The following were elected honorary life members of the Association: Mr. H. D. Bradford, Sir J. J. Fox, Mr. Noel Heston, Mr. C. A. Klein, Dr. H. H. Morgan, Dr. R. S. Morrell, and Mr S. K. Thornley.

The President's Farewell

The president, in a short valedictory address, said he took office in 1940 just before the Battle of Britain and the work of the Association became very difficult to carry on. However, the new constitution that was brought into force, whereby there was a certain amount of sectional autonomy, was a very great assistance because it enabled the sections to make their own arrangements as suited their locality and conditions from time to time. The success of that scheme had led to a considerable increase in the sectionalisation of the Association, and this had altered the whole complexion of the Association.

Among the outstanding events of the past four years was the work of the Technical Education Committee, which had done a great deal to raise the status of the Association, and he expressed appreciation of the work of Mr. G. A. Campbell, for his work as chairman of that committee, and also to the members of the committee. Thanks were also recorded to Mr. H. Clayton and the members of the Technical Advisory Council. He specially mentioned the work of Mr. G. Copping, who had been secretary-editor during a very difficult time, and had carried on the work in his usual quiet and efficient manner without a complaint. To all the honorary officers he expressed appreciation of their work, and he concluded by welcoming Dr. Keenan.

On the motion of Mr. W. Garvie, a very cordial vote of thanks was given to Mr. Wornum for his services during the past four years. Mr. G. Copping paid a special and personal tribute to Mr. H. D. Bradford, now retiring after many years as hon. treasurer.

Dr. H. W. Keenan then took the chair, and after expressing his appreciation of the honour done him in selecting him president, said that on September 25, the paint industry was to start a Merchant Navy Week. He outlined the scheme whereby it is hoped to raise £2500.

Barytes in Scotland

A Plea for Modern Development

AN interesting article on Barytes in Scotland is contributed by Mr. W. H. Reynolds, well known as an expert in the treatment and beneficiation of non-metallic minerals, to the *Quarry Managers' Journal* (July, 1944, p. 23). In a historical introduction he notes that the barytes industry is known to have existed in Scotland in the 16th century, and he quotes the statement that journals were kept at the Muirshiels mine, Lochwinnoch, for some 140 years, beginning about 1780. The mine closed in 1920 but was re-opened last year by Keir and Cawdor, Ltd. A similar history is recorded for the Glen Sannox mine, Arran, which was worked in 1841-62 and again from 1918, reaching a peak of production in 1934. The veins had been worked out by 1939, but development work is now going on. The Gass Water mines, Cronberry, Ayrshire, started in 1917, still maintain a high output; but of 18 Scottish localities recorded in 1922, only two are producing to-day, representing a percentage estimated at 19.2 of the total output of Great Britain, which may be compared with 45.8, 41.9, and 45.4 per cent. in the Scottish peak years 1932-34.

Imports of Barytes

Germany and America were the largest producers of barytes before the war. German firms could furnish any one of six standard grades and consumers could always rely on shipments being equal to grade samples. Italian barytes was available in four grades which were usually found satisfactory. Some spar was imported from Spain, and there was a small production in France. Algerian imports were on the increase, but the most serious competition after the war is expected to come from Canada.* Unless the British barytes industry improves its processes, products and organisation, competition from abroad will undoubtedly cause British mines to close down, as they did after the last war.

Great Britain produces now about 100,000 tons of barytes a year. The total amount required is likely to be about 170,000 tons a year. There is a strong case for increasing home production, not in mere terms of tonnage, but also in quality. It is estimated that Britain could produce over 340,000 tons a year, though there are users of barytes who believe that the British mines cannot even supply their own needs. If the mines continue to be inefficiently managed, the output and quality will certainly remain low. The demand for

barytes after the war may be as much as 50 per cent. above the peace-time consumption, because of the increased quantities required for painting and in the rubber, paper and chemical trades. The barytes industry in its present state is hardly able to cope with such a large expansion.

Mr. D. J. W. Orr, chairman of the British Barytes Producers' Association, has reminded the Association of the need for further development work leading to increased British production and reduction of imports, eradication of inefficiency, and greater co-operation among the members.

Extended Survey Required

The Geological Survey of Scotland has published its findings concerning barytes in Central Scotland only; the survey requires to be extended to all other occurrences in the country—the aim being to make Britain independent of foreign imports and to produce a surplus for export. Mr. Reynolds maintains that Scottish sources of supply can again contribute substantially to the British total; new mines would not be handicapped by inappropriate plant or out-of-date technology. Mining engineers should re-examine our barytes minefields, determine what development work is required, and make an estimate of the reserves and possibilities for a much larger output.

Large-scale samples selected from the lodes in an area would be sent to a testing station for a small-scale plant trial, to make certain that the analyst's findings work out in practice. Then correct mining instructions can be issued, showing what parts of the different lodes must be mined separately for the various grades. The equipment of the testing station would include apparatus for carrying out flotation and other processes. The station would also report on the required treatment, taking into account the types of plant installed in each area and the uses to which the products will be put.

There should be at least two testing stations, one in England and one in Scotland. Besides the functions already described, the stations should carry out research not only with the air of finding new uses for barytes and barium compounds, but also with a view to improving the quality of the grades supplied. Much of the initial work, Mr. Reynolds suggests, could be carried out at one of the Scottish universities or technical colleges, though he maintains that such work would more appropriately be done in a Government-sponsored Raw Materials Research Department, as sug-

* The British Barytes Market—a Canadian View, (THE CHEMICAL AGE, February 12, 1944).

gested by the Scottish Reconstruction Committee.

Mr. Reynolds concludes his article with a demand for better co-operation in the mining and processing of barytes generally, one of the most important points to consider being the apportionment of the raw material from the mines to the uses for which each is of most value. To-day much material of high grade is being used for purposes where a lower-grade product would be perfectly adequate; at the same time costly attempts are being made elsewhere to make a pure white product from raw barytes which is barely amenable to such treatment.

Parliamentary Topics

War Production Change-over

IN the House of Commons last week Colonel Greenwell asked the President of the Board of Trade if his attention had been drawn to the announcement by the American War Production Board that the full programme of its chairman, Mr. Donald Nelson, to prepare American industry for civilian production would be ordered to take effect from July 15, and what steps he had in view to organise British industry similarly so that this country would not be prejudiced in its post-war efforts to establish overseas trade. A similar question was put by Captain Duncan.

Mr. Dalton: I have studied this announcement carefully. The concessions which it foreshadows for experimental work on post-war models are all subject to the condition that war production must not be impeded. H.M. Government is prepared to consider, subject to the same overriding condition, requests from British manufacturers for similar facilities to prepare for peace-time production, but I must point out that our limited resources are now heavily strained by the claims of urgent war production.

Colonel Greenwell: May we have an assurance that, when the time does come for turning over to peace-time manufacture, manufacturers in this country will be given at least equal facilities with those in America, for getting an early start?—Mr. Dalton: A number of my colleagues and myself are giving much thought and attention to this matter, but the war must come first. Next, after the war, must come the restoration of our peace-time trade and particularly exports.

Captain Duncan: Is the right hon. gentleman making any attempt to obtain international agreement between the United States of America and ourselves, with regard to the change-over from peace to war?—Mr. Dalton: Yes, sir, indeed. There is machinery of an elaborate and

complete kind for constant exchange of views on these matters.

Mr. Shinwell: If we should reach a maximum in any category of war production, will it be possible, in view of what is happening in the United States, to switch over to civilian production?—Mr. Dalton: If my hon. friend will read my answer carefully he will find that that point was covered.

Steel Production

Mr. Thomas Fraser asked the Minister of Production whether he was satisfied that the production of steel in this country was adequate. Mr. Lyttelton replied that he was satisfied that the quantity of steel produced in this country, together with that imported from the U.S.A., was adequate to meet essential war needs; and that, within the limits imposed by the availability of raw materials, transport, and other factors, full use was being made of our available capacity.

Mr. Fraser: Is there any justification for the reduction in the production of steel in this country just now? Great alarm is being expressed in America at the reduction there, yet we are importing steel from America. Can we have some explanation?—Mr. Lyttelton: A number of questions are involved. There are certain circumstances, which are being dealt with by an *ad hoc* committee, and which are caused by changes in programme. The need for relieving the load of inland transport is another factor.

Mr. Shinwell. Why is it that in certain parts of the country men have been dismissed from steel works, on account of redundancy, yet we are importing large quantities of steel ingots from the United States?—Mr. Lyttelton said it was a very complicated question and he invited Mr. Shinwell to put the question on the order paper.

The Minister of Supply was asked by Mr. Fraser to explain how the Government undertaking in paragraph 24 of the White Paper on Employment Policy (regarding former depressed areas) could be reconciled with the fact that even to-day steel works in West Scotland were being closed down and workers transferred to other areas, and even to other industries. Sir Andrew Duncan's reply was that work had not been transferred to other areas, and he added that any cut which had taken place had been very small and uniformly applied in all of what were the depressed areas, in the light of transport considerations and in view of the operational demands.

Mr. Shinwell: In view of the right hon. gentleman's great knowledge of the steel trade and the possibilities of its development, will he look at this matter afresh in order to prevent any of our steel trade being sacrificed in the interests of concerns in other countries? Sir A. Duncan: The

steel industry of this country is not sacrificed for anything but operational demands.

—Mr. Shinwell: Could not the right hon. gentleman speak about the future?—Mr. R. J. Taylor: Are we to regard this as an ominous sign of what will happen in the steel industry when peace comes?—Sir A. Duncan: I should very much hope not.

Mr. Fraser then suggested that the personnel of the Scottish steel industry must have been reduced by 13 per cent. in the last six months, many of the workers being transferred to other industries. Sir Andrew Duncan said he had no exact figures on that point, but maintained that the lowering of production was trifling.

Germany's Oil Supplies

Mr. A. Edwards asked the Parliamentary Secretary to the Ministry of Economic Warfare for an estimate of the reduction in Germany's supplies of minerals and synthetic oil resulting from British and U.S.A. air attacks on oil refineries and other oil installations. Mr. Foot replied that it was estimated that German synthetic oil production was reduced by 50 per cent. in June, and that the output of refined products from crude petroleum by Germany and her satellites declined by 40 per cent. in the same month. So great was the damage to refineries that the combined crude oil production of Germany, Austria, Hungary and Rumania was considerably in excess of the refinery capacity available, with the result that a substantial part of the production of the wells had to be shut down. The reduction in total Axis oil supplies from all sources was estimated to have amounted to 25 per cent. in May and to 40 per cent. in June. Moreover, the distribution of the production which remained to the enemy had been rendered increasingly difficult and precarious by attacks on his communications.

Spanish Iron Ore

In answer to a question from Mr. G. Strauss as to the scale of iron ore exports going from Spain to Germany, Mr. Dingle Foot, Parliamentary Secretary to the Ministry of Economic Warfare, stated that in recent months, iron ore had been sent from Spain to enemy-occupied territory at the rate of about 45,000 tons a month. By far the greater part of this quantity was carried in enemy or enemy-controlled ships sailing from Spain to French Biscay or Mediterranean ports. A number of the ships which had been engaged in this traffic sailed under the Spanish flag and belonged to an enemy-controlled country. The number of these ships had now been reduced to three small vessels. Speaking from recollection, he thought that two ships flying the Spanish flag had been sunk in the past year.

Industrial Design

Research Organisation Formed

IN consideration of the generally expressed desire for an organised service of industrial research designers, a company has been formed, under the leadership of Sir William Crawford, entitled Sir William Crawford & Partners, Ltd., to further the aims of product and packaging design, by translating theory into practice through the medium of a group of technical experts.

This new group was sponsored originally by an advertising house. Product and packaging design appeared to be complementary activities to the normal work of a large advertising agency, and in respect of market research this is the case. After a year of experimental work, however, it became apparent that, if real progress were to be made, the group should be disassociated from advertising and developed along different lines. Accordingly, this new company has been formed independent of the concern which gave it birth.

The technical director is Mr. Warnett Kennedy, who has specialised in prefabrication techniques of building, and is director of research to the Building Plastics Research Corporation, Ltd.

He is assisted by a team of experts in industrial design in its many aspects; and of special interest to industrial chemists and chemical engineers is the inclusion, in this team, of Dr. A. M. J. Janser, Ph.D., Dip. Eng., M.I.Chem.E., who has engaged in chemical engineering research both in his native city of Vienna and at the Kaiser Wilhelm Institute, Berlin. Since 1929 he has been engaged on the development of industrial processes and production plant; and he has been in England since 1934.

The Chemist's Function

The connection between the chemical industries and industrial design may be summarised under a few heads. For example, the chemical engineer can advise on developments in paint technology, colours, the chemistry of plastics and their physical properties, and other raw materials, together with the processes connected therewith. The chemist can give unbiased reports on the chemical composition of a product, its performance and limitations.

In the course of development work for given markets, the chemical engineer can report on competitive materials and suggest new markets or the extension of existing markets. Chemists are continually discovering new applications for materials and products originally developed for other purposes. The guidance of a fully qualified technician can thus be invaluable in the presentation of goods to the public.

Personal Notes

MR. G. R. GOODMAN, F.R.I.C., has been elected to the Council of the Institution of Factory Managers.

DR. DAVID BAIN, D.Sc., lecturer in technical chemistry, has been appointed Reader in the Faculty of Science at the University of Edinburgh.

The first Marloth Memorial Medal has been awarded to DR. J. L. B. SMITH, senior lecturer in chemistry at Rhodes University College, by the Royal Society of South Africa.

MR. R. G. BERCHEM, M.Sc., takes over the post of general manager of Jeyes' Sanitary Compounds Co., Ltd., from Mr. H. M. Spackman, who has resigned for reasons of health.

MR. A. B. INGLIS, DR. C. H. KELLAWAY, F.R.S., MR. L. G. MATTHEWS and MR. J. RUSSELL have been elected directors of the Wellcome Foundation, Ltd., and DR. THOMAS DEWAR has been appointed secretary.

A rubber technologist, MR. J. LEWIS, of London, and a steel smelter, MR. J. H. JONES, of Manchester, are among the six nominees for consideration as prospective Labour candidates for Bolton, Lancs., at the next general election. It will be remembered that Mr. Jones was one of the trade unionists who crossed the Atlantic last January to tell the Americans something of the British war effort.

DR. W. K. SLATER, D.Sc., F.R.I.C., formerly chief technical officer, has been appointed secretary of the Agricultural Improvement Council for England and Wales. He succeeds Mr. J. C. F. Fryer, who resigned his position on his appointment as secretary of the Agricultural Research Council last month. The Agricultural Improvement Council, originally set up for three years only in 1941, is to be established on a permanent basis in order to promote continuous close contact between farmer and scientist.

DR. E. W. SMITH, C.B.E., president of the Institute of Fuel, has acceded to the request, made unanimously by the Council, that he should continue in office for a further twelve months (until October, 1945). At the same meeting the Council awarded the Melchett Medal for 1944 to DR. J. G. KING, O.B.E., Director of the Gas Research Board, for outstanding work during his long association with the Fuel Research Station at Greenwich. It is also announced that MR. H. L. PIRIE, who has served as an honorary secretary of the Institute since its inception, has been made an honorary member.

Obituary

F/O. EDWARD R. DAVIES, who before entering the Fleet Air Arm was analytical chemist of the Swansea Vale Spelter Works, Swansea, is reported killed on operations.

THE PRIESTLEY GAVELS

In a recent issue we referred to the gavel, made from the wood of a persimmon tree that grows at Joseph Priestley's American home, which Mr. Wallace P. Cohoe, as president of the Society of Chemical Industry, sent to this country for presentation to the Royal Society. According to *Chem. and Eng. News*, there are two such gavels, and the other is being given to the American Chemical Society. As that journal puts it, they are "symbolic of the cordial spirit of Anglo-American unity among chemists of the English-speaking world." Priestley's name is associated with the American Chemical Society in so far as the suggestion to form a National Society of Chemists was made at the centenary celebrations that were held on July 31, 1874, to commemorate his discovery of oxygen. In years to come the gavels and the boxes containing them will provide mementoes of the chemistry of 1944, for the metal bands on the gavels consist of the alloy illium which was devised as a substitute for platinum; the persimmon wood is finished with a special varnish supplied by the Bakelite Corporation; and the inscription on the boxes is covered with a sheet of methyl methacrylate resin from E. I. du Pont de Nemours & Co. THE CHEMICAL AGE understands that the Royal Society's gavel will be presented to the Society's secretary, Professor A. V. Hill, F.R.S., on the occasion when the adjourned annual general meeting of the S.C.I. is resumed.

TRANSYLVANIAN MINERALS

A considerable development of the metallurgical and chemical industries is recorded from Hungary. Efforts are being made to exploit iron and copper deposits in Southern Transylvania, where six mining plants and one metallurgical works are already in operation at Nagybánya, working with private capital under Government support. The chemical industries have been united in a concern controlled by the Hungaria Chemical and Smelting Company, which recently took over the Phoenix Works and now directs all the iron mines as well as the chemical and metallurgical industries of Transylvania. The manganese plants at Macskamező are now the property of the Hungarian State Iron Works. The discovery of large mica deposits which are being exploited by the electrical concern of Ganz & Co. in association with the State Mining Administration in Nagybánya, is expected to be of great economic importance.

General News

—From Week to Week

A list of amendments to the Toilet Preparations Register, issued by the Board of Trade, is now available, price 1d., from H.M. Stationery Office or through any bookseller.

Small quantities of penicillin are being sent to Germany through the Red Cross for the treatment of specified patients among British prisoners of war.

Workers in 2081 firms and organisations in Ireland became contributing members of the Red Cross Penny-a-Week Fund during the first half of this year.

The Merchant Navy Comforts Service has received a donation of £3 from the employees of The Chance and Hunt Works of I.C.I. General Chemicals, Ltd.

Two factory forms just published by the Stationery Office are entitled *Memorandum on Precautions in the Use of Nitrate Salt Baths* (4d.) and *Nitrate Salt Baths* (1d.). The forms are respectively Nos. 848 and 849.

Sodium desoxycholate, sodium glycocholate, sodium taurocholate, and sodium tauroglycocholate will not in future be chargeable with Purchase Tax unless put up for medicinal or veterinary use.

The address of the Drugs Branch, Home Office, is now 52 Prince's Gate, London, S.W.7. Applications for import or export licences under the Dangerous Drugs Acts, however, must continue to be sent direct to the Finance Branch, Cornwall House, Stamford Street, London, S.E.1, as hitherto.

D.T.D. Specification No. 639 for glass fabric has been published by the Stationery Office, price 6d. Other specifications just published are No. 251C, Rubber Tubing for Oxygen-Breathing Apparatus (superseding No. 251B), price 1s., and No. 402A, Bullet-Proof Safety Glass for Windscreen Panels, price 1d.

Last week's chemical targets for the R.A.F. and for the U.S.A.A.F. included synthetic oil plants at Scholven-Buer and Wesseling, in the Ruhr; a chemical factory making oxygen and hydrogen on the outskirts of Munich, and a hydrogen plant and four hydrogen peroxide plants at Peenemünde, on the Baltic.

The Iron and Steel Control of the Ministry of Supply has prepared summaries, for general circulation, of the price schedules relating to alloy steel, stainless steel, bright carbon steel bars and flats, bright mild steel wire (in straight lengths) and wire products (wire netting and second-hand barbed wire). The full schedules are, of course, available for inspection at the Control offices, but it is thought that these summaries will be of general convenience for reference purposes.

Twenty new projects or expansion schemes, giving employment to 2800 men and women, were approved by the Regional Board for Scotland in June. Four of the projects involve new plant and buildings valued at £130,000.

A joint report on "The Teaching of Mathematics to Physicists" has been issued by the Mathematical Association and the Institute of Physics. Though it relates specifically to the training of physicists, it is believed that the recommendations contained in it may be of equal interest to teachers of engineering and other sciences. Copies may be obtained gratis from the Institute of Physics, at the University of Reading, Berks.

Wholesale prices of both chemicals and oils and of non-ferrous metals maintained their slow but steady rise in June, according to the Board of Trade Index Figure. Chemicals were up 0.1 per cent., from 151.6 to 151.7 (1930 = 100), while non-ferrous metals rose from 127.6 to 128.0 (0.4 per cent.). The increases recorded in May in the price of brass and lead began to have their full effect in June. Iron and steel prices also rose fractionally, from 183.2 to 183.4 (0.1 per cent.).

Lightweight Concrete Aggregates, Bulletin No. 15 of the Building Research Board, has been revised and published by the Stationery Office, price 3d. Foamed slag, which has been made in Britain for the past nine years, receives well-merited attention, it being stated that the total capacity of the plants making it is of the order of 150,000 tons a year, a figure likely to be increased after the war. The author of the bulletin is Dr. F. M. Lea, F.R.I.C.

Foreign News

The price of nylon, on most types of nylon yarn to fill military contracts, has been reduced by Du Pont de Nemours & Co., of America, to 15 cents per pound.

Canadian Industries, Ltd., has presented an annual scholarship worth \$750, tenable in the science department of Laval University, Quebec.

The Barium Reduction Corporation of America has established a research project at Illinois University to study and investigate the uses and rôle of strontium compounds in the field of ceramics.

Anglo-American delegates to the oil conference assembled at the State Department at Washington on Tuesday to open the discussions which are expected to lead to informal agreement, if not to a formal treaty, governing oil development and distribution after the war.

The prospects of tin mining in Tanganyika form the subject of a bulletin (No. 16) recently issued by the Department of Lands and Mines.

The National Dehydrators' Association of America is planning an extensive research and post-war development programme for the food dehydration industry, which will cost the industry about \$50,000.

Bolivian exports of tungsten show a rise of more than 10 per cent. compared with last year's general average and it is probable that the figures will be surpassed from month to month.

Limited amounts of aluminium for paint pigments have been released by W.P.B., Washington, as well as a small amount of copper for use in lead plating. Restrictions on the use of zinc and aluminium for medical and surgical purposes have also been lifted.

Commercial Solvents Corporation of America has set up a Pharmaceutical Division with its head office in New York to handle penicillin from their plant at Terre Haute, Indiana, claimed to be the largest penicillin factory in the world.

Styrene dibromide is being produced on a commercial scale by the Dow Chemical Co., of Michigan. One use it has found is for controlling the thread-worms that infect ears of corn.

Platinum wire, 0.000013 in. thick, is being used experimentally in the engineering laboratory of the General Electric Company at Schenectady, N.Y. The product is manufactured by drawing thin silver wire with a platinum core to a thickness of 0.002 in., and the silver is dissolved away in a few drops of nitric acid.

A new orange-coloured pigment of cotton-seed is claimed to have been isolated by three American chemists of the U.S. Department of Agriculture. It is said to differ markedly from gossypol, compared with which it is less soluble in most organic solvents. Reactions of the substance are given in a communication to *J. Amer. Chem. Soc.*, 1944, 66, 5, p. 838.

Agreeing that taking scientists under 26 years old would "deter the conduct of the war," President Roosevelt has assured American industry that chemists and men of related scientific skill, regardless of age, will receive special consideration in future administration of the Selective Service Act. A directive issued in February has caused consternation in the United States since the call-up of any deferred man under 26 was threatened. Strenuous representations by the American Chemical Society no doubt served to make the Government realise that output in war factories would drop if technical men were called up regardless of individual indispensability.

Cadmium, as a coating two-hundredths of an inch thick, is being electroplated on steel sheets by Thomas-Thiel Inc., of Wilmington, U.S.A. Approximately, 30 lb. of cadmium is deposited on each 8 ft. by 2 ft. by 1 in. sheet, and the thickness of the deposit is many times that obtained in ordinary cadmium electroplating.

Exploitation of the asbestos deposits of the Cia. Minas de Amianto, Tinaquillo, Venezuela, is to begin on arrival of the necessary machinery. The estimated capacity of the plant is 960 tons of rock daily, or 500 tons of asbestos monthly. It is understood that the longer-staple fibre will be exported and that the shorter staples will be used at home.

A synthetic rubber from lactic acid was described by C. H. Fisher, W. C. Mast, C. E. Rehberg and Lee T. Smith, of the Eastern Regional Research Laboratories, Philadelphia, at the recent meeting of the Rubber Division, American Chemical Society. The new rubber is known as Lactoprene. The acid is transformed into methyl acrylate, and thence to the rubber compound.

Anhydrous sodium thiosulphate on a commercial scale is being made by A. R. Maas Chemical Co., of South Gate, California. Though by no means a new chemical, this compound has never received much attention. By changing to the anhydrous salt, a great saving in packaging is effected, and the fact that the substance is not spoiled by heat makes it specially suitable for tropical use.

The Canadian company, Aluminium, Ltd., has acquired bauxite properties in Jamaica which give promise of being one of the important world sources of this ore of aluminium. Work carried on by this company since 1942 will lead to the opening of a mining industry and should ultimately result in the erection of a plant for the treatment of ore on the island. The company, in collaboration with the Colonial Government, is embarking on a programme of agricultural development of its newly acquired lands along scientific lines with a view to increasing the self-sufficiency of the community.

Forthcoming Events

The **Institution of Chemical Engineers** is holding a joint conference with the **Institute of Physics** and the **Chemical Engineering Group** at the Royal Institution on **September 22 and 23**. The subject is "Instruments for the Automatic Controlling and Recording of Chemical and other Processes." Further particulars will be obtainable next month from the Organising Secretary Joint Conference, Institution of Chemical Engineers, 56 Victoria Street, London, S.W.1.

COMPANY MEETING**Beechams Pills, Limited****An Encouraging Year**

THE sixteenth ordinary general meeting of Beechams Pills, Ltd., was held in London on July 19. Mr. Louis Nicholas, J.P. (vice-chairman), presided and read the statement of the chairman, Mr. Philip E. Hill, which was as follows.

The trading profit for the year ended March 31 last, earned by the companies of the group operating in the British Empire and in almost all parts of the world other than Europe, amounted to £1,471,560, as compared with £1,269,334 in the previous year. The overseas trade was most satisfactory and provided encouraging hope for the post-war period.

Our group of companies, the statement said, has contributed to the National Exchequer £1,079,152 in excess profits tax and national defence contributions, and £595,885 in income tax, a total of £1,675,037.

Taxation Reserve

Preference shares in subsidiary companies have been redeemed during the year to the amount of £105,019. As this sum came from taxed profits after paying income tax at 10s. in the £, the amount provided from profits was £210,038. A small number of shares in a subsidiary company were sold during the year at an excess over book value of £192,404, and this sum has been placed to capital reserve. The group as a whole has a reserve set aside for future taxation amounting to approximately £300,000. Nothing has been included in the accounts in respect of the post-war refund of excess profits tax, which is estimated to amount to £269,000 after allowing for income-tax thereon at 10s. in the £. The Chancellor of the Exchequer in his Budget speech in April last gave satisfactory assurances with regard to this refund.

Extension of Interests

This business commenced over 100 years ago by the sale of the proprietary medicine which gives its name to the company, but at the present time many goods other than proprietary medicines are sold, and your directors are year by year extending beyond proprietary medicines the variety of the group's products.

During the past four years much time and thought has been devoted to the development of overseas trade, and the company is confident of making a considerable contribution to the export trade of this country which will be so necessary after the war.

The report and accounts were unanimously adopted.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ABBEY PLATING WORKS, LTD., Alpertou. (M., 29/7/44.) July 3, mortgage, to Credit for Industry, Ltd., securing £3500 and further advances; charged on land and buildings at Wembley. *—, September 27, 1941.

DAVEY, PAXMAN AND CO., LTD., Colchester, engineers. (M., 29/7/44.) June 29, mortgage and further charge, to Colchester Permanent Benefit Building Society, securing £2320, including £2000 secured by a mortgage dated December 16, 1942; charged on 9 Stanwell Terrace and 15 to 22 St. Leonards Road, Colchester. *£55,530, September 3, 1943.

Partnership Dissolved

DICKER, POLLAK, MERCER, TENCH AND MEYER (S. G. S. Dickier, J. E. Pollak, R. Mercer, F. Tench and L. W. Meyer), Halton House, 20-23 Holborn, E.C., and 5 Castle Street, Liverpool, chartered patent agents, June 30, 1944. Debts by J. E. Pollak, R. Mercer and F. Tench, who continue as Pollak, Mercer and Tench.

Company News

Lovering China Clays, Ltd., record a net profit, for the year ended March 31, of £129 (£112), leaving a debit balance forward of £25,562 (£25,690).

William Gossage and Sons, Ltd., are paying an ordinary dividend of 35 per cent. (30 per cent.) for 1943, and announce a net profit of £297,277 (£293,191).

With a final distribution of 10 per cent., Boots Pure Drug Co., Ltd., will have paid a total ordinary dividend of 30 per cent. (24 per cent.) for the year ended March 31. Net profit is £533,834 (£643,345).

Chemical and Allied Stocks and Shares

SENTIMENT in stock markets has reflected the encouraging trend of the war news, and values have again shown an upward trend, industrial shares again being

strongly favoured on hopeful assumptions as to the scope for higher earnings and dividends after the war. Despite the advance in prices, profit-taking was on a moderate scale. In fact, many shares were in small supply in the market, and this tended to accentuate the upward movement. Gilt-edged stocks continued firm, and again tended higher in price, indicating general confidence in the outlook.

The units of the Distillers Co. were again a prominent feature, rising further to 107s., while British Plaster Board rallied to 38s. 3d. United Molasses were strong at 39s. 9d., the latter on expectations that the accounts will show a strong and liquid financial position. Imperial Chemical were well maintained at 40s. 6d. and were inclined to move higher. Borax Consolidated have been firm at 39s., British Oxygen strengthened to 84s., and British Aluminium to 51s. 9d. Lever & Unilever were firm at 42s. 6d., on the view that the results are likely to show higher profits, although the general assumption is that the dividend may again be limited to 5 per cent. Earnings in recent years have been much in excess of this, and the pre-war 10 per cent. dividends could have been easily maintained, but a conservative policy has been followed awaiting the time when the position in regard to the dividend equalisation agreement with the Dutch Lever N.V. can be clarified in the light of war developments. R. A. Lister were firm at 83s., it being pointed out that last year's 16 per cent. dividend was covered by earnings of well over twice this rate on the shares. General Electric were higher at 98s. 9d. xd. on the results and the maintained 17½ per cent. dividend; this company's accounts show a particularly strong position.

Guest Keen moved higher to 41s., but elsewhere, Allied Ironfounders eased to 51s., after rallying to 51s. 6d., and Babcock & Wilcox at 54s. 3d. lost part of an earlier advance. Davy Engineering were 32s., awaiting the financial results, while Dorman Long were firm at 28s. 3d., as were United Steel at 27s. 3d., Stewarts & Lloyds deferred at 58s., Tube Investments at 101s., and Staveley ordinary at 55s. 9d. Consett Iron 6s. 8d. units strengthened to 9s. on the full results. Talk of the possibility of a slightly higher dividend was reflected by activity around 11s. 7½d. in Richard Thomas 5s. ordinary shares. Textiles were prominent, with Bradford Dyers and Calico Printers higher on balance. On the other hand, Courtaulds and British Celanese have not held best prices, although British Enka rose sharply to 19s. 6d.

Boots Drug remained an active feature, and although best prices were not held, these 5s. units at 57s. 6d. again advanced on balance, the market being impressed by the strength of the balance sheet. Moreover, it

is assumed the dividend would not have been increased unless there were considered good prospects of the higher rate being maintained. Timothy Whites were higher at 37s., Sangers 28s. 6d., and Beechams deferred moved up to 18s. 10½d. Triplex Glass were higher at 44s. on talk of an improved dividend. Associated Cement moved higher at 69s. 6d., Radiation were 62s., and Crittall Manufacturing 31s. B. Laporte were 85s., Monsanto Chemicals 5½ per cent. preference 23s., British Drug Houses higher at 27s., and Burt Boulton 24s. 6d. Greff-Chemicals 5s. ordinary were 8s. 3d., and W. J. Bush were quoted at 66s. 3d. Leading oil shares again moved up, "Shell" being 88s. 9d., Burmah Oil 89s. 3d., and Anglo-Iranian 121s. 10½d.

British Chemical Prices

Market Reports

REPORTS from makers and distributors show that the general position of the London general chemicals market with regard to supplies and prices is practically unchanged. The holiday season has not been entirely without influence and there has been a slight slackening in deliveries, while only a limited amount of new business has been placed. In the soda products section, offers of chlorate, bichromate, and prussiate of soda are scarce and quotations are strong, while firm prices are ruling for soda ash, Glauber salts and salt cake. Offers of bicarbonate of soda and nitrite of soda are quickly absorbed. An active market is reported for white powdered arsenic, formaldehyde, and pure and refined glycerine and there is a brisk inquiry for supplies of hydrogen peroxide. There is no change in the position of the lead oxides, for which there is a moderate inquiry. A firm price position is maintained in the potash section, supplies of caustic potash and bichromate of potash being allocated to priority consumers. Yellow prussiate of potash continues scarce with values nominal. A good demand is reported for permanganate of potash and makers' quotations are unchanged. Prices throughout the coal-tar products market remain unaltered and home consumption of pitch is on a fair scale. A steady demand is reported for creosote oil, cresylic and carbolic acids, and there is fair buying interest in the toluols, benzols, and xylols.

MANCHESTER.—In spite of the fact that several Lancashire cotton towns have been on holiday during the past week, there has been a fairly steady demand for bleaching, dyeing, and finishing chemicals, chiefly against contract, though a certain amount of new business in these and other materials

has been reported. With regard to prices, these are well held and are strong in undertone, with little in the way of actual movement to report. In the market for tar products, creosote oil is a very active section, and a steady demand continues for the tolouls and benzols, with a fair trade passing in most other classes.

GLASGOW.—The Glasgow Fair holidays are still in operation, and in consequence business continues quiet. Export inquiries are steady and prices remain stationary.

Price Changes

Lactic Acid.—Pale tech., £57 per ton; dark tech., £50 per ton ex works; barrels returnable.

Telephone:
Terminus 2030

The mark of
precision and
efficiency.



Telegraphic
Address:
"Gasthermo,"
Smich, London.
BRITISH MADE
THROUGHOUT

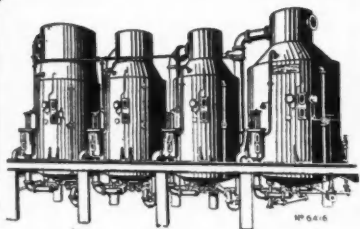
If you use neat—it pays to measure it accurately

B. BLACK & SON, LTD.

1, Green Terrace, Rosebery Avenue, London, E.C.1
Thermometer Manufacturers (Mercury in Glass Type)

Of all the principal Scientific Instrument and
Laboratory Apparatus Manufacturers.

Mirrlees' VERTICAL TYPE EVAPORATORS

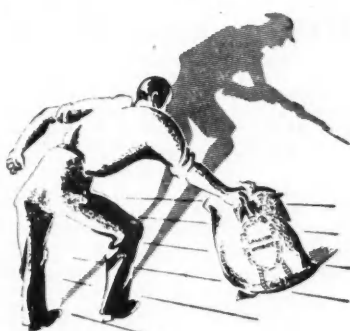


Single and Multiple Effects for Chemical Liquors, Fruit Juices, Sugar Liquors and Syrups, Caustic Lye (e.g. in Soda Recovery), Accessory Condensers, Vacuum Pumps and Centrifugal Pumps.
OUR WIDE EXPERIENCE ENSURES
ECONOMICAL AND RELIABLE EQUIPMENT.

MIRPLEES WATSON
COMPANY LIMITED

ENGINEERS

GLASGOW



Fighting Lime!

Under present conditions, don't overlook pure Calcium hydrate. It's often used to save soda, making which necessarily consumes more man-power and fuel. Where possible, therefore, substitute pure Calcium hydrate in the national interest. Prepared by our process it is a very light powder, easily soluble, easily suspended and notably free from unburnt carbonate and overburnt oxide. Data on uses gladly supplied. Write to-day for special booklet A.1., "Calcium Hydrate."

SOFNOL CALCIUM HYDRATE

Telephone :



GREENWICH
1600

Sofnol Ltd., Westcombe Hill, Greenwich, S.E.10

THE BRITISH ASSOCIATION OF CHEMISTS

protects the ECONOMIC INTERESTS to the Chemical Profession.

- its members, when seeking employment, are consistently advised to ask for salaries appropriate to their status and responsibilities.
- A comprehensive survey of the prospects of POST-WAR EMPLOYMENT for Chemists is being carried out.
- By protecting its members against Unemployment, the Association upholds the economic interests of all chemists.

For particulars of Membership, write to:—

C. B. WOODLEY, 175, Piccadilly, London, W.I.
C.R.A., F.C.I.S.,
General Secretary, B.A.C.

EDUCATIONAL

Great Possibilities for

QUALIFIED CHEMICAL ENGINEERS

Key Men in Wartime and Afterwards.
MANY of the finest posts in Britain in Wartime are reserved for Chemical Engineers. The same will be the case when the war is over. The vast technique and experience now being applied to Chemical Technology for war purposes will then be suitably utilised in reconstruction, and in trade and commerce.
Enrol with the T.I.G.B. for A.M.I.Chem.E. Examinations in which home-study Students of The T.I.G.B. have now gained "—

THREE "MACNAB" PRIZES.

Including the "MacNab" Prize awarded at the last (1943) Examination.
Write to-day for "The Engineer's Guide to Success"—free, containing the world's widest choice of Engineering Courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,

219 Temple Bar House, London, E.C.4.

FOR SALE

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD.**, "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

'Phone 98 Staines.

HEAVY toothed Crusher. Small Autoclave 4' x 27" Copper Vacuum Pan 40 Gals. Jacketed pan 3' by 3' 6". Six Open Tanks 5' 8" deep by 3' 9" diam.

HARRY H. GARDAM & CO. LTD.
STAINES.

NON-SCRATCH POWDER CLEANSER—regular bulk supplies in bags. Write for sample giving approximate quantities desired. Box 2177, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PUMP, Vertical, 3 Throw, by Bailey: 10 in. Plungers by 14 in. Stroke, geared belt drive. **THOMPSON & SONS, (MILLWALL), LTD.**, Cuba Street, Millwall, London, E.14. East 1844.

100 REBUILT Hydro Extractors by all leading makers from 18 in. upwards with countershafts attached and safety covers. Jacketed Steam Pans, various sizes. List on request. Seen at Randalles, Arundel Terrace, Barnes. Telephone: Riverside 2436.

LACTIC ACID SULPHONATED OILS TANNERS' MATERIALS

BOWMANS (WARRINGTON), LTD CHEMICAL MANUFACTURERS

Moss Bank Works : : : Near WIDNES

Secondhand GRINDING AND CRUSHING PLANT

WET GRINDING MILL by Brouthers, 20 ft. 0 in. long by 4 ft. 0 in. dia.; Silex lined; complete with charge of manganese steel grinding balls, automatic feed arrangements and screening discharge equipment.

Continuous sieving type **BALL MILL**, 6 ft. 6 in. dia. by 4 ft. 0 in. wide, fitted ten renewable grinding plates with $\frac{1}{4}$ in. dia. perforations; secondary and final screens to requirements; feed through trunnion bearing; mill encased in mild steel casing.

No. 1 size **Lightning CRUSHER and GRANULATOR**, swing hammer type, capacity 5.6 tons per hour of $\frac{1}{2}$ in. and under, 30 cwt.s. per hour $\frac{3}{4}$ in. and under; max. feed size 3 in. cube.

'Ajax' **CRUSHER** by Goodwin Rarsby, swing hammer type; beater chamber 24 in. by 13 in. wide; feed opening 13 in. by 5 in.; shaft carried in ring oil bearings and fitted with vee rope pulley; approx. 7.8 h.p. required to drive; capacity 5.6 tons per hour $\frac{3}{4}$ in. and under.

No. 2 size **DISINTEGRATOR** by Booth, with octagonal beater chamber 2 ft. 8 in. between flats; rotor shaft carried in roller bearings, rotor arranged eight renewable beaters and belt driving pulley; 40 h.p. required to drive at 3,200 r.p.m.

DISINTEGRATOR by London Grinding Co.; beater chamber 3 ft. 6 in. dia.; screening surface 66 in. by 5 in. wide; rotor fitted with four fixed hammers and arranged with belt pulley; approx. 28 h.p. required to drive at 1,500 r.p.m.

Twin barrel horizontal **rod GRINDING MILL**, each barrel 4 ft. 6 in. long by 3 ft. 6 in. dia. inside; mild steel body; cast iron end plates; barrels mounted in heavy cast iron frame; arranged for belt drive through bevel gearing and clutches to each mill.

Twin roll underdriven rotating pan type **EDGE RUNNER MILL** or **SAND MILL**, 3 ft. 4 in. dia. by 6 in. deep; stationary rolls 1 ft. 8 in. dia. by 64 in. face; pan driven through crown wheel and pinion from extended shaft.

GEORGE COHEN, SONS & CO., LTD.,
STANNINGLEY, near LEEDS and
WOOD LANE, LONDON, W.12

1000 STRONG NEW WATERPROOF APRONS.
To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. **WILSONA, Springfield Mills, Preston, Lancs.** Phone 2198.

PATENTS & TRADE MARKS

THE Patentees of British Patents Nos. 522,077 and 536,806 entitled "Improvements in or Relating to Cellulose Ether Coating Compositions," and "Preparation of Esters of a Chloracrylic Acid," respectively, are desirous of entering into arrangements for the granting of Licences to manufacture under these Patents. All enquiries should be addressed to **F. L. CLEVELAND & COMPANY, Chartered Patent Agents, 29, Southampton Buildings, London, W.C.2.**

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—**THOS. HILL-JONES, LTD.**, "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East

WANTED

WANTED.—Supplies of Nitre Cake in ten-ton lots.
Box No. 2126, THE CHEMICAL AGE, 154 Fleet
Street, E.C.4.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON
(Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of
**CHEMICAL WORKS, PLANT AND
MACHINERY,**

York House, 12 York Street, Manchester.

Telephone: 1937 (2 lines) Central, Manchester.

The fact that goods made of raw materials in
short supply owing to war conditions are adver-
tised in this paper should not be taken as an
indication that they are necessarily available for
export.

**THE "TEANTEE" STANDARD
PORTABLE CONVEYOR**

**FIXED & PORTABLE
CONVEYORS,
FABRICATED
STEELWORK
ETC.**



14in. belt
25ft. cra.
Suitable
for a wide
variety of
materials

T. & T. WORKS LTD.
Phone: BILLESDON 261
BILLESDON, LEICESTER

"ZULO"

CARBOY HAMPERS

**LEIGH
& SONS
METAL
WORKS**

Orlando St
BOLTON.

**CHEMICAL LEADWORK**

TANKS — VATS — COILS — PIPEWORK

W. G. JENKINSON, Ltd. Telephone
22473
156-160, ARUNDEL STREET, SHEFFIELD

Specialists in

Carboys, Demijohns, Winchesters

JOHN KILNER & SONS (1927) LTD.
Tel. WAKEFIELD 2042 Established 1867

TRIBASIC PHOSPHATE OF SODA

Free Running White Powder

Price and sample on application to:

PERRY & HOPE, LIMITED, Nitshill, Glasgow

**SWIFT
& COMPANY PTY. LTD.**

Specialising in

**INDUSTRIAL CHEMICALS, SOLVENTS,
PLASTICS, AND MATERIALS FOR MANU-
FACTURING INDUSTRIES THROUGHOUT
AUSTRALIA AND NEW ZEALAND.**

Open to extend connections with

BRITISH MANUFACTURERS

Head Office: 26/30, Clarence Street, Sydney, N.S.W.
and at
Melbourne, Adelaide, Perth, Brisbane and Wellington
N.Z.

Cable Address: SWIFT, SYDNEY

Bankers: Bank of New South Wales, Sydney and
London.

May we quote ?

Long experience
has given us re-
cognised leadership
in the making of
**COMPLETE TAR
PLANTS: NEW
STILLS: OR RE-
PAIRS: RIVETED
or WELDED Benzol
Stills, Tanks, Jack-
eted Fans, etc.**



for . . . **Steel
Plate Work**

for Chemical Processes

LEEDS & BRADFORD BOILER Co. Ltd.
STANNINGLEY Near LEEDS

Lennox Foundry Co. Ltd.

Specialists in non-ferrous
Castings for the Chemical
Industry



Glenville Grove, London, S.E.8

NITRALLOY STEELS

Nitrogen case hardened by the
NITRALLOY patent process,
SURFACE HARDNESS 1050-1150
Brinell—"the hardest Metal Sur-
face known to man." Write now
for full particulars.

NITRALLOY LTD.

25, TAPTONVILLE RD., SHEFFIELD, 10.
Phone: 60689, Grams: Nitralloy, Sheffield

"LION BRAND" METALS AND ALLOYS

MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc.

BLACKWELL'S METALLURGICAL WORKS LTD.

GARSTON, LIVERPOOL, 19
ESTABLISHED 1869



DISCOVERY

keeps you informed
on everyday science
with popular arti-
cles and news by
leading authorities

1/6 MONTHLY
19/- annual subscription

EMPIRE PRESS
NORWICH

RUBBER FRICTION SURFACE BELTING & ENDLESS VEE ROPES

of
Superlative Quality
Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.

BURSLEM - Stoke-on-Trent

'Phone Stoke-on-Trent 7181.

'Grams: Belting, Burslem

COTTON BAGS

AND

LINERS for SACKS, BARRELS and BOXES

WALTER H. FELTHAM & SON., LTD.

Imperial Works, Tower Bridge Road,
London, S.E.1

For Acid
or
Gritty Liquors

DIAPHRAGM PUMPS

THE
PREMIER

FILTERPRESS Co., Ltd.
Grosvenor Chambers,
Wallington, Surrey.
Tel: Wallington 1635

| | |
|---|--|
| GROUND BONE FLINT FLUORSPAR QUARTZ WHITING, Etc. | OXIDES OF ANTIMONY, ARSENIC CHROME, COBALT, SMALT, COPPER, IRON, MANGANESE, NICKEL, TIN, TITANIUM, URANIUM, ZINC, Etc. |
| CARBONATE SULPHATE BARYTES | |
| WENGERS LTD. CERAMIC COLOURS & CHEMICALS ETRURIA, STOKE-ON-TRENT, England. | |
| COLOURS POTTERS, GLAZED BRICK MANUFACTURERS & GLASSMAKERS | PREPARED ENAMELS CAST & SHEET IRON COPPER & JEWELLERY |

JULY

LI

BA

SA

B

V

DOW

SOU

Manufacturers of

LIQUID FILLING MACHINES
FOR BARRELS, CANS AND DRUMS;
BARREL WASHING MACHINES
SAFETY ELECTRIC HAND
LAMPS AND TORCHES
BARREL & CAN INSPECTION
TORCHES
VACUUM & PRESSURE RELIEF
VALVES
FOR SPIRIT STORAGE TANKS

Send for illustrated lists

DOWNES ENGINEERING WORKS
LIMITED
SOUTHFIELD ROAD • ACTON
LONDON, W.4.

PURE DISTILLED

FATTY ACIDS

OF EVERY DESCRIPTION

**Drying, Half-Drying
and Non-Drying**

VICTOR WOLF
LTD.

Victoria Works, Croft Street
Clayton, MANCHESTER, 11

Telephone
Telegrams

EAST 1082-3
GLYCERINE
Manchester

FOUR OAKS SPRAYING MACHINES for FACTORY LIMEWASHING

The "FOUR OAKS" way of
quick and easy Limewashing,
Colourwashing, Distemping
and Disinfecting.

BRIDGEWATER
PATTERN
SPRAYING MACHINE
is made in two sizes,
18 galls. and 30 galls.

Catalogues free

All Prices are
subject to con-
ditions prevail-
ling at the time
Orders are re-
ceived.

Sole Manufacturers:

The Four Oaks Spraying Machine Co.

Four Oaks Works, Four Oaks, BIRMINGHAM

W. C. G. LUDFORD, Proprietor.

Telegrams:

"Sprayers, Four Oaks."

Telephone:

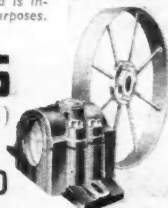
305 Four Oaks.



SHAFTING

Power Transmission Appliances in the widest range
of sizes are standardised and stocked to meet all
general requirements. **Shafting, Couplings, Bear-
ings, Pulleys, Clutches, Variable Speed Gears,
Reducing and Increasing Gears, Geared Motors,
etc.** Our catalogue S. 140 gives full particulars,
dimensions, prices, etc., and is in-
valuable for reference purposes.
Copies on request.

CROFTS
(ENGINEERS)
LTD
BRADFORD



Largest Sole Makers of Power Transmission Appliances

**MINING AND
INDUSTRIAL
CHEMICALS**

CYANAMID PRODUCTS LTD

**DESIGN
AND
ERECTION
OF
CHEMICAL PLANTS**

WAR TIME ADDRESS
BERKHAMSTED, HERTS.



**DONKIN
COMPRESSORS**
for GAS or AIR

High Speed
Vertical Reciprocating Type

Splash Lubrication
Water cooled Cylinders
Hand Unloading device

Easy Accessibility
to working parts
Robust Construction

THE BRYAN DONKIN CO. LTD.
CHESTERFIELD

